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12 MAY 1986

Europe Report

SCIENCE AND TECHNOLOGY

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EUROPE REPORT

SCIENCE AND TECHNOLOGY

WEST EUROPE

EAST EUROPE

WEST EUROPE/ADVANCED MATERIALS

SWEDISH FIRMS DEVELOP, PRODUCE SUPER CERAMICS

Stockholm NY TEKNIK in Swedish 16 Jan 86 p 23

[Article by Peter Lange: "Super Ceramics Replace Metal"]

[Excerpts] All around the world, efforts are being made to produce high performance ceramics which tolerate high temperatures and hard wear and are very slightly affected by corrosive agents.

The development started about ten years ago, when the main goal was to replace components in combustion engines, components which have a difficult geometry and place great demands on tensile strength.

Brittleness has always been the great problem for ceramics.

Ceramics have made a commercial breakthrough in cutting tools. Milling and grinding machines, used for tooling hard metals, become more effective with ceramic cutters.

Withstands Heat

"The reason is that the ceramic keeps its edge even at very high temperatures," says Thommy Ekstrom, who is responsible for research and development of ceramic materials at Sandvik.

"When the tooling speed becomes too high, the metal cutter turns into chewing gum. Speeds at least three times as high can be obtained with a ceramic cutter."

At the same time, the concentration on engine components and even entire automobile engines has continued. The wheels in a turbo assembly, for instance, may well be made from ceramics.

"The lower density of the ceramic wheel provides more efficiency, since it is easier to make it spin," says Robert Pompe, who is project leader for construction ceramics at the Swedish Silicate Research Institute in Goteborg. "The wheel cannot rust and it is so hard that there is hardly any question of wear."

Asea Cerama in Robertsfors is developing such a turbo wheel with isostatically hot pressed silicon nitride. It is expected to be finished in a few years. Asea has also sold the production rights to the Swedish company, Seco Tools,

which will make ceramic cutters and to an American company which will make balls for ball bearings. Ceramic balls have low density which produces lower centrifugal force, higher relative speed and less friction.

It may become possible to give metals better properties by combining them with ceramics. Metals can be coated with a ceramic layer by means of a so-called plasma sprayer.

The method involves blowing a ceramic powder through an electric arc onto the metal at a temperature of about 5000°C. The coating functions as insulation and, in addition, protects against corrosion.

But there are problems with the development. The poor tenacity of ceramics is the largest. One way to solve that problem may be to reinforce the material. Shapes which are liable to break must also be avoided.

The raw materials are found in quartz, carbon, and nitrogen--primarily silicon nitride and silicon carbide. One advantage, compared to most metals, is that the raw materials exist almost everywhere. They are still relatively costly, but will probably become less expensive as the market grows.

Robert Pompe believes that, in five to fifteen years, the new applications will grow into a billion-kronor industry in Sweden.

12339/12795
CSO: 3698/383

WEST EUROPE/BIOTECHNOLOGY

DANISH NOVO PLANS TO PRODUCE INSULIN FROM YEAST

Stockholm NY TEKNIK in Swedish 23 Jan 86 p 7

[Article by Staffan Dahllof: "Biotechnological Breakthrough. Insulin From Ordinary Yeast"]

[Text] Copenhagen--The Danish firm, Novo, will probably be the first in the world to utilize gene-manipulated yeast commercially. The yeast fungi will secrete insulin.

An environmental campaign against the "genetic pollution" of nature, however, threatens to put the brakes on Novo's plans.

"I am completely convinced that there will be an appeal against our permit," says Steen Andersen, vice-president of the pharmaceutical department at Novo.

His conviction is well-founded.

Representatives for the environmental organization, Noah, have recently lodged an appeal against a permit for the company Nordisk Gentofte to manufacture human growth hormone with gene-manipulated E-coli bacteria.

Noah is now seeking authorized representatives to appeal Novo's permit also.

The two companies that have landed in the center of a newly awakened Danish environmental debate, are both pioneers in biotechnology.

Nordisk Gentofte maintains that it can gene-manufacture a cleaner growth hormone than that of its Swedish competitor, KabiVitrum. The company also says it can produce insulin with gene technology--but it does not want to--and that it is far ahead in the development of the protein factor eight with genetically altered micro-organisms. (Lack of growth hormone may cause dwarfism, lack of insulin may cause diabetes and lack of factor eight may cause hemophilia.)

Novo was first in the world with human insulin produced from insulin from pigs.

Eli Lilly, their competitor in the United States, then took the lead with the help of hybrid-DNA technology. Eli Lilly uses E-coli bacteria, the number one standard tool of biotechnology.

Ordinary Yeast

Novo accepted the challenge with an application for permission to use three different types of genetically altered micro-organisms: E-coli, yeast fungi and the bacterium Bacillus subtilis.

Shortly before Christmas, they received a permit to utilize Sacharomyces cervisie-ordinary yeast.

"Yeast has certain advantages," says vice-president Steen Andersen. "It is a totally harmless organism to humans and to nature.

"Yeast fungi do not form spores which can spread it further. And we can separate the insulin after fermentation without crushing the cells, which has to be done with E-coli bacteria."

The ability of yeast to secrete a desired protein such as insulin, for which it has been encoded, has been discussed earlier. If Novo has now mastered the technology on a large scale, this would be a biotechnological breakthrough.

Shortlived

It hasn't been as easy for the company to break through in the debate.

The micro-organisms in question are harmless in themselves and extremely short-lived if they were to get out in nature. So far Novo's critics agree.

But what happens if their altered genetic code spreads to more vigorous families of fungi or bacteria?

"Nobody knows. That is why we have to demand an ecological risk evaluation," argues Jesper Toft, geneticist and spokesman for the environmental organization, Noah.

Steen Andersen of Novo rejects the criticism: "You cannot make a risk evaluation without practical experience. And commercial use of gene-technology is something entirely new.

"Furthermore, the vector that transmits the genetic code cannot function in other organisms. Consequently there is no difference between gene-manipulated yeast and ordinary yeast.

"But a relevant question does exist: If our yeast cells were to be eaten by a human, would insulin production start in the stomach? The answer is no, and even if it were to happen, the body cannot extract insulin from the intestines," says Steen Andersen.

Criticism Difficult to Handle

Even though Novo and Nordisk Gentofte consider that they have all the arguments on their side, they've had trouble handling the criticism.

Silence about earlier experiments and personal alliances between the companies and authorities have hurt their credibility. Furthermore, there is a full-scale government debate about suggestions for new Danish laws governing gene technology applications.

As long as the politicians have not taken a stand, no permits ought to be issued, argue the critics.

But the companies are in a hurry.

Both Novo and Nordisk Gentofte have threatened to move their production to another country if their applications are not approved during the spring.

12339/12795
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WEST EUROPE/FACTORY AUTOMATION

FACTORY AUTOMATION MARKETING DATA FOR SPAIN

Barcelona REVISTA DE ROBOTICA in Spanish Nov-Dec 85 pp 36-45

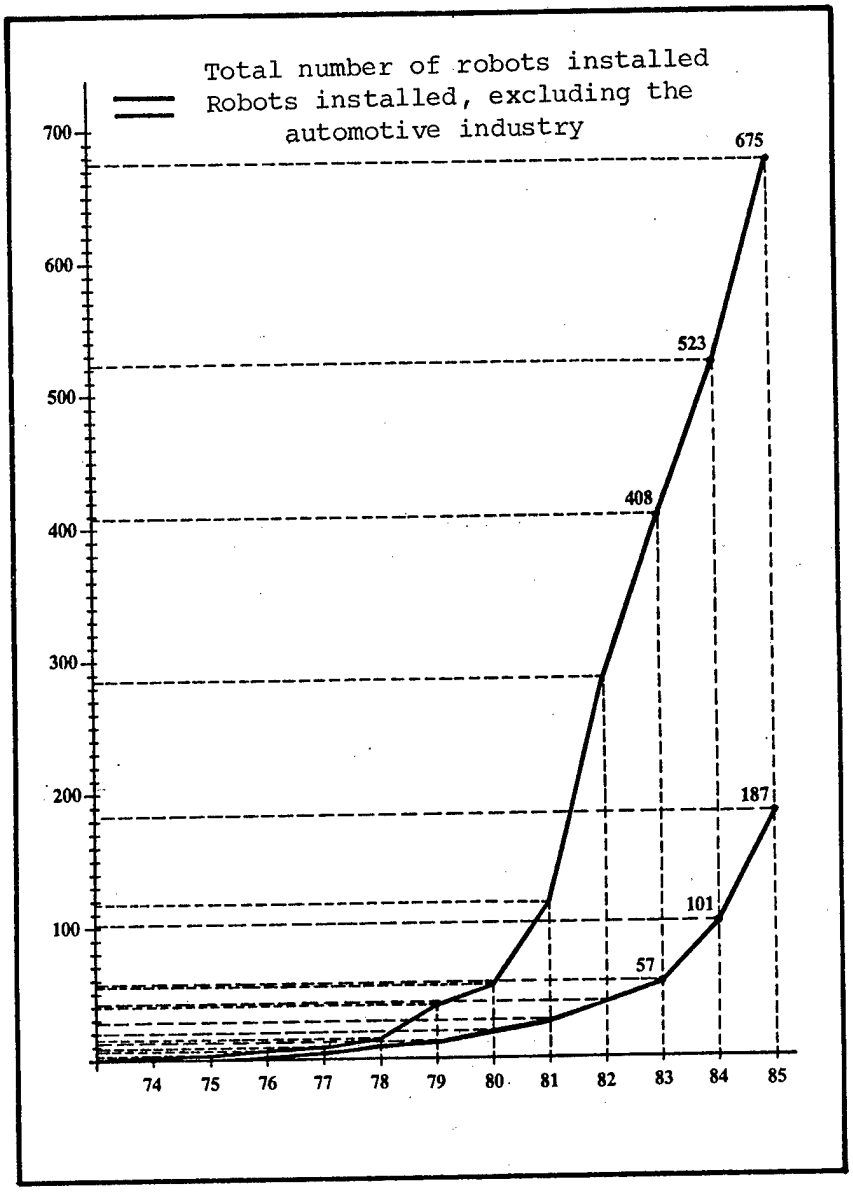
[Text] During the past year, 152 new robots have been added to Spain's factories. This brings to 675 the number of robots now used in Spanish industry. Of these, 187 are working in a variety of sectors, and 488 are used in the automotive industry.

In 1985, 44 companies installed their first robot. The use of robots for manipulation applications, adhesive application and assembly work is considerably increasing, as is also true with robotics systems in other countries.

The number of robots sold in Spain in 1985 (152 robots)--37 more than the number sold in 1984--indicates that the robotization of Spanish industry is remaining at a rate of growth of about 30 percent. It can be said, then, concerning the annual increase in robots after the initial surge in robotics observed in 1984, that growth has been practically stationary, with no significant acceleration or deceleration. This would seem to suggest that we are in a stabilized situation, remaining at a rate that might be considered relatively low in comparison with other countries which began this process earlier. Nonetheless, a somewhat more detailed analysis of the figures shows a trend that may give 1985 a much more positive hue in the field of robotics than what might have been expected from a more cursory glance. We are referring to where these robots have been installed.

As has already been said many times, in every country robots got their start in industry in the automotive sector. For years this industry occupied first place in terms of the number of robots installed. However, starting in 1980 in the countries which relied most heavily on robots (Japan, the United States, West Germany, Sweden, etc.), robotization began to increase in other sectors, so that by 1983, the total number of robots installed annually in other sectors began to considerably surpass the number of robots installed in the automotive industries. At this point, it may be considered that the industry of that nation had made an express option for flexible automation. 1985 may be considered the year in which this process began in a noticeable manner in Spain. In 1984, the number of robots installed in the automotive industry was 408; the remaining sectors had a total of 115. Then in 1985, the latter figure increased substantially. This means that the rate of

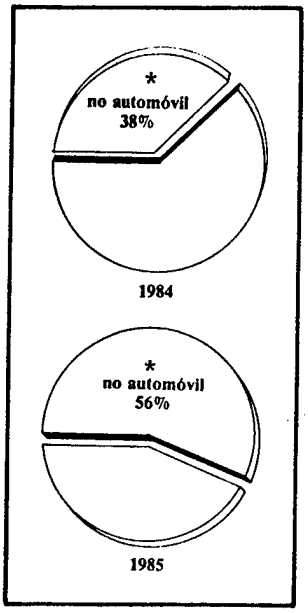
increase of robots in Spanish industry, excluding the automotive industry, was simply higher than in previous year. Of the 152 new robots listed in the past year, only 66 went to automotive industries, while in 1984, 71 of the 115 new robots had gone to automotive industries. A very considerable number of these robots were purchased by companies from the sector which we have grouped together under the category of metal transformation industries. This category includes automotive auxiliary industries, construction of farm machinery and machine tools, bicycles, subcontracting companies, etc.



Growth of the number of robots in Spain.

The Impact of the SCARA [Selective Compliance Assembly Robot Arm]

A somewhat similar line of reasoning may be used in regard to robot applications. Spot welding still remains in the lead, but there is now a lesser distance in regard to other applications, such as manipulation--here we are also including loading and unloading of machinery--and arc welding. The reasons can be found in the previously indicated fact of the greater diversification of sectors in which robots are now being used (in the automotive industries, there are a large number of work stations that use spot welding) and, in the case of arc welding, also because more complex technological options have appeared for this application during the past year.



1985: The robots sold to other sectors exceeded the number sold to the automotive industry.

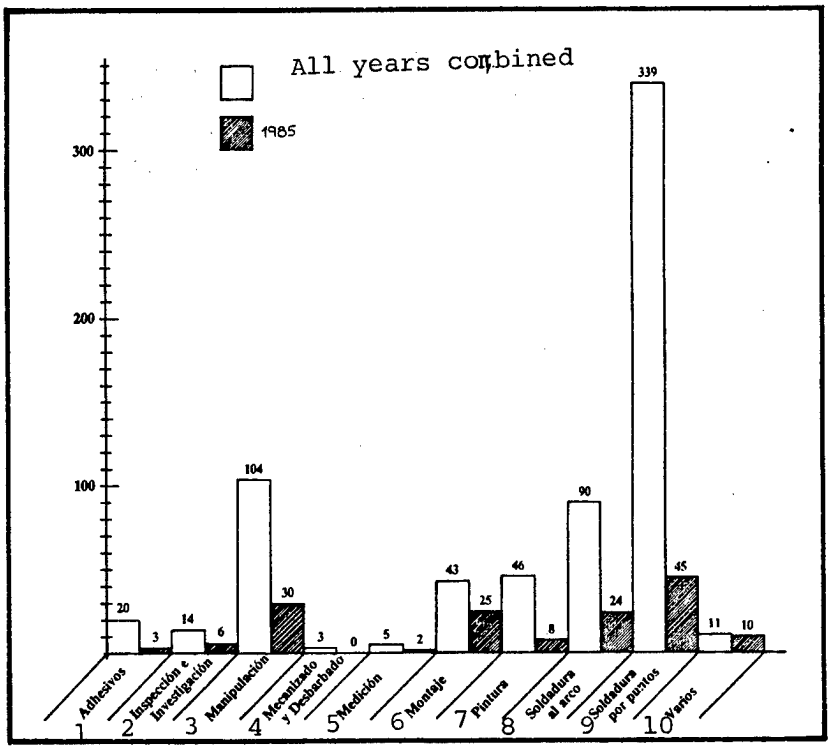
* non-automotive

Assembly deserves a separate heading. As in other countries, the number of robots working on this type of task rose considerably in Spain when the SCARA configuration robots appeared on the market. These are quite simple, and in general, highly economical systems.

We may conclude, then, that unlike what might at first have been thought, Spanish industry is not as far behind in this field as it may have been in some other aspects of technological modernization, and we would venture to put its lag in relation to other members of the European Community at about 4 or 5 years. Its growth seems to be following the same pattern that has been observed in the European Community nations.

Furthermore, we should add that in the past year the possible stimulating effects to be expected from the central and autonomous administrative plans,

and especially from the Guidelines, could not yet been observed. For this reason, another hopeful note can be added to this year's already positive trends in terms of the number of robots that may be installed in 1986.



Distribution of robots in Spain according to applications.

Key:

1. adhesives
2. inspection and research
3. manipulation
4. mechanical assembly and deburring
5. measurement
6. assembly
7. paint spraying
8. arc welding
9. spot welding
10. miscellaneous

SECTOR	Company		Application	Brand	Model	Yr Installed up to 83	1984	1985	TOTAL	TOTAL SECTOR
Aeronautics	CASA	1	Desbarbado	ASEA	IRB-60/2	1				
				ASEA	IRB-60/2		1			
										2
									2	
	CPC	2	Manipulación	UNIMATION	2000		1			
Power Supply										1
									1	
Automotive	CITROEN (Hispania)	3	Soldadura por puntos	COMAU	POLAR-6000			8		
			Soldadura por puntos	ACMA CRIBIER	HORIZ. 80	8				
			Soldadura por puntos	ASEA	IRB-60S	8				
			Soldadura por puntos	COMAU	POLAR-6000	9				
			Soldadura por puntos	ASEA	IRB-90			8		
			Soldadura por puntos	COMAU	SMART			3		
		4	Sellado	ASEA	IRB-6AW/2			1		
									45	
	FASA (Sevilla)		Manipulación	UNIMATION	2000	2				
			Manipulación	ASEA	IRB-6	1	9			
		5	Formación	ASEA	IRB-6		1			
									13	
	FASA (Valladolid)	6	Pintura	TRALLFA	TR-4000			1		
			Manipulación	UNIMATION	1000	1				
			Manipulación	ACMA CRIBIER	VERTICAL	7				
			Soldadura por puntos	ACMA CRIBIER	VERTICAL	2	6			
			Soldadura por puntos	ACMA CRIBIER	HORIZONTAL	25	11			
		7	Montaje	ACMA CRIBIER			2			
			Pintura	TRALLFA DEVILBISS	TR-3000	4				
		8	Soldadura al arco	ASEA	IRB-6AW/2			1		
			Sellado	ASEA	IRB-6/2		1			
			Sellado	ASEA	IRB-6/2			1		
		9	Aplicación Poliuretano	ASEA	IRB-60/2			1		
									63	
	FORD (España)	10	Adhesivos	ASEA	IRB-6	1				
			Soldadura por puntos	ASEA	IRB-6	1				
			Manipulación	UNIMATION	DUALMATE	4				
			Manipulación	ASEA	IRB-6	2				
			Manipulación	ASEA	IRB-60/2		2			
			Manipulación	ASEA	IRB-6/2		3			
			Soldadura por puntos	ASEA	IRB-605	29				
			Soldadura por puntos	KUKA	IR-601/60	25				
			Soldadura al arco	ASEA	IRB-6	4				
			Pintura	NORDSON		6				
			Montaje	DEA S.p.A.	A3000*		1	1		
		11	Soldadura remache	ASEA	IRB-6/2			1		

SECTOR	Company	Application	Brand	MODEL	Yr Installed up to 1983	1984	1985	TOTAL	TOTAL SECTOR
Automotive		12 Limpieza	YAMAHA	SCARA-IK7011			1		
		13 Paletizador	DEA S.p.A.	GANTRY			1		
		Manipulación	PIANELLI & TRAVERSA ESPAÑOLA	PORTICO VISION (6 axes)		3			
		Manipulación	VOLSWAGEN		1				
		Montaje	YAMAHA	SCARA		2	7		
								95	
	ENASA	14 Engatillado	ASEA	IRB-90 M/2			1		
								1	
	GENERAL MOTORS	Soldadura al arco	UNIMATION	PUMA 600	23				
		Adhesivos	UNIMATION	PUMA 600	8				
		Adhesivos	UNIMATION	9006	6				
		Manipulación	UNIMATION	9006	1				
		Soldadura por puntos	UNIMATION	9006	115				
		Pintura	GEC	COMP/ARM	18				
		15 Inspección	ASEA	IRB/60	2				
								173	
	MEVOSA	Soldadura al arco	UNIMATION	3000	1				
		Soldadura al arco	ASEA	IRB/6		2			
		Soldadura al arco	ASEA	IRB/6			2		
								5	
	SEAT (Barcelona)	Adhesivos	ASEA	IRB/6	1				
		Soldadura por puntos	COMAU	POLAR-600	5				
		Soldadura por puntos	UNIMATION	2000	8				
		Soldadura por puntos	UNIMATION	4000	7				
		Soldadura por puntos	ASEA	IRB-605	4				
		Manipulación	UNIMATION	2000	4				
		Soldadura por puntos	ASEA	IRB-6			2		
		Pintura	HITACHI	SV-6D			3		
		Soldadura por puntos	HITACHI	M-6060			1		
		Soldadura por puntos	VOLSWAGEN				19(1)		
								54	
	SEAT (Landaben)	Soldadura por puntos	ASEA	IRB-60 S		23			
	SEAT (Martorell)	Soldadura al arco	ASEA	IRB-6 AW/2		5			
								28	
	TALBOT	Manipulación	UNIMATION		1				
		Manipulación	ASEA	IRB-60/2	1				
		Soldadura por puntos	UNIMATION		1				
		Soldadura por puntos	ASEA	IRB-90 S/2	2				
		Soldadura por puntos	COMAU	POLAR-600	2				
								7	
	(C)	Soldadura al arco	UNIMATION	PUMA 550	1				

SECTOR	Company	Application	Brand	MODEL	Yr Installed up to 1983	1984	1985	TOTAL	TOTAL SECTOR
Automotive	MOTOR IBERICA	Soldadura por puntos	ASEA	IRB-90			1	1	
	(C)	Soldadura por puntos	UNIMATION	PUMA-762			1	1	
	(C)	Manipulación	UNIMATION	PUMA-550			1	1	
								1	
Ceramics & Construction	ROCA RADIADORES	Pintura	UNIMATION	PUMA-600		2			488
	VITRO METAL	Pintura	TRALLFA DE VILBISS	TR-3000	5			2	
	(C)	Pintura	TRALLFA DE VILBISS	TR-400		2		5	
								2	
Electric. Machinery Construct.	ASEA	Manipulación	UNIMATION	2000	3				9
		Manipulación	UNIMATION	4000	1				
		Manipulación	ASEA	IRB-60	2				
	(C)	Soldadura al arco	UNIMATION	PUMA-760			1	6	
	(C)	Manipulación	DANOBAT	DR-1			2	1	
								2	
Household Appliances	BRAUN	Manipulación	UNIMATION	PUMA-600	1				9
	BALAY		ASEA	IRB-6		1		1	
	MONIX	Manipulación	YAMAHA	SCARA-IK7011			1	1	
								1	
Electronics	AMPER	Montaje	UNIMATION	PUMA-600	1				3
								1	
Railway Equipment	TAFESA	Soldadura al arco	ASEA	IRB-6AW/2	1				1
	ATEINZA	Soldadura al arco	ASEA	IRBL-6 AW/2		1		1	
	FAVESA	Soldadura al arco	ASEA	IRB-6 AW/2		1	1	1	
								2	
Research	INST. CIBERNETICA		UNIMATION	PUMA-600	1				4
								1	

SECTOR	Company	Application	Brand	MODEL	Nr. Installed up to 1983	1984	1985	TOTAL	TOTAL SECTOR
Research	IKERLAN		UNIMATION	PUMA-600	1				
			ASEA	IRB-60	1				
								2	
	(C)		UNIMATION	PUMA-560			1		
								1	
	(C)		UNIMATION	PUMA-560			1		
								1	
	(C)		UNIMATION	PUMA-760			1		
								1	
	INSER		UNIMATION	PUMA-600		1			
								1	
	ETSIIM		ASEA	PR-1000			1		
			ASEA	IRB-6/2	1				
								2	
	GOBIERNO VASCO		ASEA	IRB-60/2		1			
								1	
Basic Metal-lurgy	M.A.D.E.	Manipulación	CAMEL	POLIPO		1			10
		Manipulación	CAMEL	CARICATORE		1			
								2	
	REMETAL	Manipulación	UNIMATION	2000		1			
								1	
	FORJAS DE BASAURI	Manipulación	CAMEL	POLIPO multigrip	1				
								1	
	PATRICIO ECHEVARRIA	Manipulación	CAMEL	POLIPO multigrip	2				
								2	
Motor-cycles	DERBI	Soldadura por puntos	UNIMATION	2000	1				6
		Soldadura al arco	UNIMATION	PUMA-600	1				
		Soldadura al arco	UNIMATION	2000	1				
		Soldadura al arco	YASKAWA	L-100 MOTOMAN		1			
		Soldadura por puntos	ASEA	IRB-90			1		
								5	
	ABELLO S.A.	Soldadura al arco	ASEA	IRB-6	1				
								1	
	IND. RABASA	Soldadura al arco	UNIMATION	PUMA-600		1			
								1	
	MANAUT	Soldadura al arco	ASEA	IRB-6	1				
								1	
	MOTO VESPA	Soldadura al arco	ASEA	IRB-6	2				
								2	
Metal Transform.	AGRIA HISPANIA S.A.	Soldadura al arco	ASEA	IRB-6	1				10
								1	

SECTOR	Company	Application	Brand	MODEL	Yr Installed up to 1983	1984	1985	TOTAL	TOTAL SECTOR
Metal Trans-formation	AGRIC	Soldadura al arco	YASKAWA	L-10WMOTOMAN	1			1	
	ARMCO S.A.	Soldadura al arco	I.G.M.	LIMAT 2016	1			1	
	BENDIBERICA	Montaje	DEA S.p.A.	A3000*	1	1			
		Medición	DEA S.p.A.	BRAVO*		2	2	6	
	COMBITAINER	Soldadura al arco	I.G.M.	RT2806		1		1	
	COPRECI	Montaje	OLIVETTI	SIGMA	1				
		Montaje	HITACHI	3020			2	3	
	EDERLAN	Manipulación	UNIMATION	2000	1			1	
	FAINSA	Soldadura al arco	YASKAWA	MOTOMAN L10W		1		1	
	FRAYNON	Montaje	DEA S.p.A.	A3000**	1	3	9		
		Paletizador					1	14	
	FUNDACION JESUS ROMERO	Manipulación	ASEA	IRB L-6/2		1		1	
	GIRLING	Manipulación	UNIMATION	2000	1			1	
	GREYCO	Medición	DEA S.p.A.	BRAVO*		1		1	
	HISPANO MOTOR	Manipulación	UNIMATION	2000	2			2	
	HISTOBAL	Soldadura al arco	YASKAWA	MOTOMAN L10W		2			
		Soldadura al arco	ASEA	IRB-6 AW/2			1	3	
	MECANUSA	Manipulación	ASEA	IRB-6	2				
		Manipulación	ASEA	IRB-60/2	1				
		Mecanizado	OLIVETTI	SIGMA	1*			4	
	ORKLI	Montaje	OLIVETTI	SIGMA	1*			1	
	PASA	Montaje	DEA S.p.A.	A3000*		2			
		Montaje	ASEA	IRB-1000			1		
		Montaje	ASEA	IRB-400			1	4	
	PUMA CHASSON	Manipulación	UNIMATION	2000		1		1	
	RUFFINI	Manipulación	UNIMATION	2000	4	1		5	

SECTOR	Company	Application	Brand	MODEL	Yr Installed up to 1983	1984	1985	TOTAL	TOTAL SECTOR
Metal Transformation	SERIOLA	Manipulación	ASEA	IRB-60/2		1		1	
	TORNUSA	Manipulación	ASEA	IRB-60/2		2		2	
	ULGOR	Pintura	TRALLFA DE VILBIS	TR-3000	1			1	
	UNIDAD HERMETICA	Manipulación	UNIMATION	2000	1				
		Soldadura al arco	YASKAWA	MOTOMAN L-10W		1			
		Montaje	DEA S.p.A.	A3000*	1	1			
		Soldadura por puntos	ASEA	IRB-6 AW/2			1	5	
	(C)	Manipulación	YAMAZAKI	FLEX-1	1			1	
	(C)	Manipulación	YAMAZAKI	FLEX-1	1			1	
	(C)	Soldadura al arco	UNIMATION	2000	1				
		Soldadura al arco	UNIMATION	PUMA-600	3	6		10	
	ALUMALSA	Manipulación	ASEA	IRB-60			2	2	
	FOREX S.A.		ASEA	IRB-90			1	1	
	TALL. HOLGUERA	Soldadura al arco	ASEA	IRB-6		1		1	
	IRICADO	Soldadura al arco	ASEA	IRB-6			1	1	
	ZARDOYA OTIS	Soldadura al arco	ASEA	IRB-6 AW/2			1	1	
	SITUBSA	Soldadura al arco	ASEA	IRB-6 AW/2			1	1	
	FADESA	Soldadura al arco	ASEA	IRB-6 AW/2			1	1	
	GAC	Soldadura al arco	ASEA	IRB-6 AW/2			2	2	
	PIVA	Soldadura al arco	ASEA	IRB-6 AW/2			1	1	
	GAMESA	18 Soldadura Mig	CLOOS	ROMAT-56			1		
		19 Demostración	CLOOS	ROMAT-56			1	2	
	(C)	Soldadura al arco	UNIMATION	PUMA-560			1	1	
	AURKI	Manipulación	HITACHI	M-6060			1		
		Montaje	HITACHI	4020			1		
		Montaje	HITACHI	4010 H			1		

SECTOR	Company	Application	Brand	MODEL	Yr Installed up to 1983	1984	1985	TOTAL	TOTAL SECTOR
Metal Transformation								3	
	LA FARGA CASANOVA	Manipulación	ASEA	IRB-90			1		
		Manipulación	CAMEL	CARICATORE			2		
		Manipulación	CAMEL	SPECCHIO			2		
		Manipulación	CAMEL	SCARICATORE			1		
								6	
	PESA	Manipulación	YAMAHA	SCARA IK-7011			1		
		Montaje	YAMAHA	SCARA IK-7011			1		
								2	
	TVA	Manipulación	YAMAHA	SCARA IK-5012			2		
								2	
	FAESSA	Manipulación	YAMAHA	SCARA IK-5012			1		
								1	
	EATON	20 Soldadura TIC	THOMSON	TOMKAT			1		
								1	
	DAMPER	Manipulación	DANOBAT	DR-1			2		
								2	
	DANOBAT	Manipulación	DANOBAT	DR-1			1		
								1	
	(C)	Soldadura al arco	YASKAWA	MOTOMAN L-10W			1		
								1	
	(C)	Soldadura al arco	YASKAWA	MOTOMAN L-10W			1		
								1	
	(C)	Soldadura al arco	YASKAWA	MOTOMAN L-10WA			1		
								1	
	(C)	Soldadura al arco	YASKAWA	MOTOMAN L-10W			1		
								1	
	(C)	Soldadura al arco	YASKAWA	MOTOMAN L-106			1		
								1	
	(C)	Manipulación	YASKAWA	MOTOMAN L-120			1		
								1	
	(C)	Soldadura al arco	YASKAWA	MOTOMAN L-10W			1		
								1	
	(C)	21 Corte por plasma	YASKAWA	MOTOMAN L-106			1		
								1	
	(C)	Manipulación	YASKAWA	MOTOMAN L-60W			1		
								1	
									63
Miscellaneous	SOC. GRAL. DE HULES S.A.	Manipulación	ASEA	IRB-60/2			1		
								1	
	CRISTALERIA ESPAÑOLA (Sevilla)	Manipulación	ASEA	IRB-60/2			2		
								2	
	CRISTALERIA ESPAÑOLA (Arbós)	Manipulación	ASEA	IRB-60/2			2		
		22 Soldadura blanda	ASEA	IRB-6 AW/2			4		

SECTOR	Company	Application	Brand	MODEI	Yr Installed up to 1983	1984	1985	TOTAL	TOTAL SECTOR
Miscel-laneous								6	
	FLEX	Soldadura al arco	ASEA	IRB-6 AW/2			1		
								1	
	J M CABRE	Manipulación	YAMAHA	SCARA-IK-5012			2		
								2	
	(C)	Soldadura por puntos	UNIMATION	866			1		
								1	
	(C)	Soldadura al arco	UNIMATION	PUMA-550			1		
								1	
	(C)	Manipulación	UNIMATION	PUMA-762			4		
								4	
									18

(1) These robots were purchased directly from the German firm Wolgsvagen, because of SEAT's connections with this firm.

* two arms

** four arms

Key to applications:

1. deburring
2. manipulation
3. spot welding
4. sealing
5. training
6. paint spraying
7. assembly
8. arc welding
9. polyurethane application
10. adhesives
11. rivet welding
12. cleaning
13. pallettizer
14. clamping
15. inspection
16. measurement
17. mechanical assembly
18. Mig welding
19. demonstration
20. TIC welding
21. plasma cutting
22. soft soldering

Some Considerations to Remember

Unlike most of the listings of robots published in other countries, REVISTA DE ROBOTICA, following the same format it used last year, has made an effort to give the most detailed information possible, including not only the robot's model and type of application, but also the name of the company where it has been installed. It is obvious that in this way we can increase the level of accuracy of the information, as it can easily be checked. However, the reader will also observe that this time there is a larger number of cases than last year in which we have been asked to preserve the confidentiality of this information (this is indicated with the letter "C" in the space for the company). This raises some doubt about whether it will be possible to continue to provide this information in future editions.

It is also important to point out that SCARA-type robots have been included, as they are by most Robotics Associations, such as BRA and RIA, and also that robots which are listed in the box for 1985 are the ones which were sold and delivered in 1985 (not leased or lent on a trial basis). But this does not mean that they are all working at full capacity at this time. This standard was used, as it was last year, because setting the moment when a robot reaches its full output is in most cases difficult, and the period of its start-up may be a long one, depending on many factors, which at times are not attributable to the robot itself. We should also mention the non-inclusion of IBM robots sold in Spain. This omission is due to IBM's policy of not releasing this type of information. However, based on data collected from various sources, it appears that IBM may have sold four to five robots. These are SCARA-type robots especially suitable for assembly applications. Finally, the reader may notice some slight variations in regard to data published in REVISTA DE ROBOTICA no 10, for the figures reported for earlier years. This is due to the correction of some typographical errors and also to the fact that more complete information is now available. For example, the total number of robots at the end of 1984 has been checked. Instead of 516 (as reported in REVISTA DE ROBOTICA no 10), it was 523. In regard to applications, there have also been some changes. Given the versatility of robots, it seems reasonable that in some instances they may be switched from one work station to another. We should also note that in automotive plants, where a very large number of robots are installed, some of the robots used for specific applications are inactive and held in reserve for use during possible equipment failures or temporary work backlogs.

As a final consideration, we should indicate that despite having done the most exhaustive fieldwork possible, it is likely that the number of robots in Spanish industry may be slightly higher, but the difference can not be much above four or five robots.

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WEST EUROPE/FACTORY AUTOMATION

TYPES OF ROBOTS USED IN SPAIN

Barcelona REVISTA DE ROBOTICA in Spanish Nov-Dec 85 pp 51-56

[Article by F. Casas and J. Llado, department of mechanics of ETSHZ]

[Excerpts] This study analyzes the various structural characteristics of the robots available in Spain at the beginning of 1985. They are classified according to their most important features. Then the authors draw a number of conclusions, based on a comparison of these features with those of the robots available in Europe in 1979.

In this study, the industrial robots now offered for sale on the Spanish market are classified in accordance with their most signifcant structural features. The results given cover 92 models from 30 different manufacturers.

The main objective of this article is to provide current information on the mechanical features of today's robots. At the same time, though, these data have been compared with data published in 1979 by A. Liegeois and E. Dombre, covering a robotic population of 150 models then available in Europe.

For the preparation of the various tables and charts, the listing of industrial robots available in Spain published in REVISTA DE ROBOTICA no 11 was used. To this we also added information from catalogues supplied by specific commercial firms. Although we did not assemble all the pertinent data concerning the structural features of the robots available, the results do reflect trends in the development of the mechanical structures of industrial robots in recent years.

Classifications of Robots Presently Available in Spain

Using the current data on the robotic population available in the Spanish market, various classifications based on the most characteristics structural properties were prepared:

a. number of degrees of freedom
b. structural configuration of the arm
c. load capacity
d. type of power supply
e. repetibility

From the charts for each of these classifications and their comparison with the results published by A. Liegeois and E. Dombre, we were able to deduce a number of considerations concerning the trends and development of the mechanical structures of industrial robots in recent years.

Number of Degrees of Freedom (DOF)

It is of interest to point out the clear increase in robots with six or more degrees of freedom, indicative of a demand for increasingly versatile robots (see Figure 1).

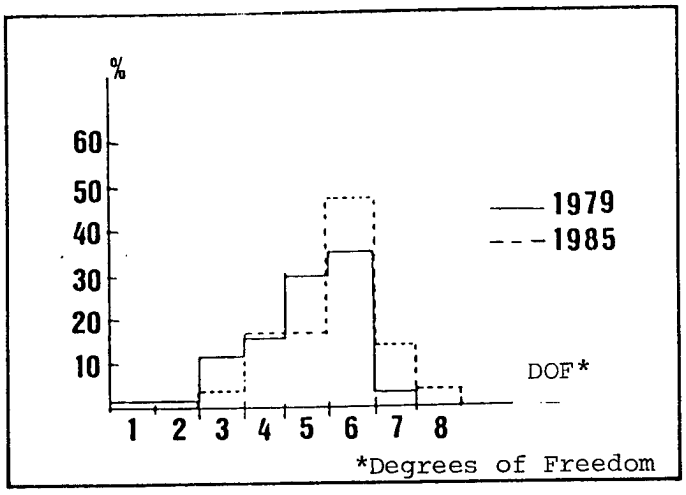


Figure 1: Number of degrees of freedom

Robots with seven or eight degrees of freedom possess additional maneuverability, superior to universal robots with six degrees of freedom. This enables them to get around obstacles, giving them access to specific hard-to-reach points within the work area. In such areas a flexible hand structure may be required, as in the case of a paint-spraying robot for the interior of auto bodies, called an "elephant's trunk."

This additional mobility may involve solely the robot's hand (as in the paint-spraying robot of the "elephant's trunk" type made by ACMA CRIBIER), or the entire structure, which may involve one or more linear displacements (as in the pendular robot IRB1000 made by ASEA).

In considering the number of degrees of freedom of the hand, we found that 64 percent have more than three degrees of freedom, compared with 42 percent in the past. So it is of value for the hand to be able to adopt completely general orientations inside the work volume.

Structural Configuration of the Arm

It was found that the most usual type of arm structure is one with angular coordinates. There has been a very significant increase in the use of this configuration, and a boom in recent years of SCARA [Selective Compliance Assembly Robot Arm] robots, combined with a great decline in the supply of robots with cylindrical coordinates (see Figure 2).

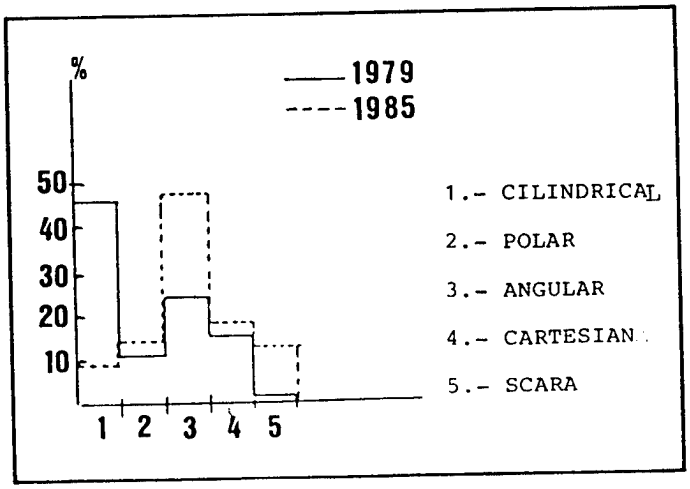


Figure 2: Structural configuration of the arm

Angular and SCARA structures offer an advantage over cylindrical structures as they are able to get around or bypass obstacles, with their two-stage rotational kinematic links and parallel axes (in the form of calipers or dividers), but they also have the disadvantage of possible interferences with elements of the surrounding area. For example, a structure with angular coordinates may create problems in the vertical plane if it reaches the height of the ceiling.

Load Capacity

The great majority of robots still manipulate light loads. While in 1979 for the remainder of load intervals the robots available were quite similar, with new technological innovations in recent years there has been a considerable increase in robots that can handle heavy loads (over 50 kilograms). See Figure 3.

The load capacity will be related to the rigidity provided by the arm's structural configuration. From a study of this load-structure binome, based on the robots presently available in Spain, we extracted the following information.

a. About three/fourths of the robots available with cylindrical coordinates have a heavy load capacity.

b. Polar robots work best with medium or heavy loads, even though they are distributed over a broad spectrum with load capacities above 1 kilogram.

c. Angular robots handle medium loads best.

d. Among the cartesian type of structural options, 40 percent handle heavy loads, ranging as high as 500 kilograms.

e. SCARA configurations handle light and medium loads, especially loads under 15 kilograms.

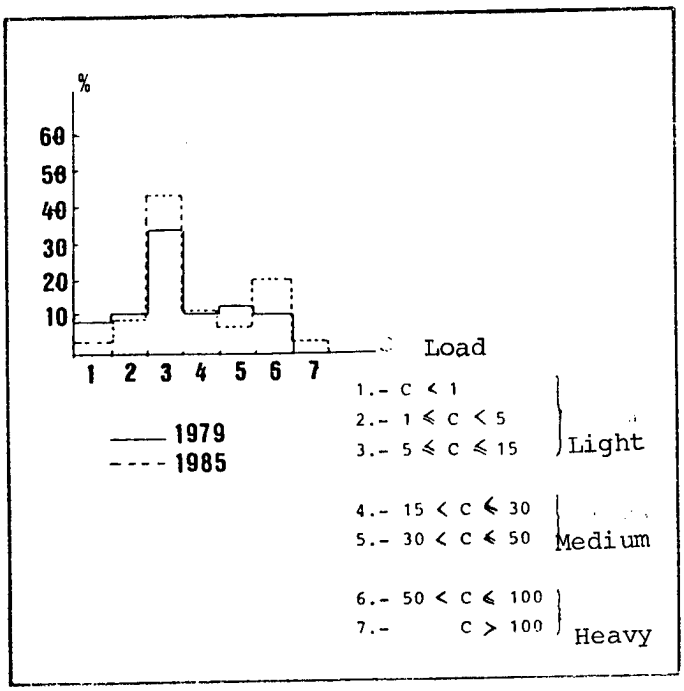
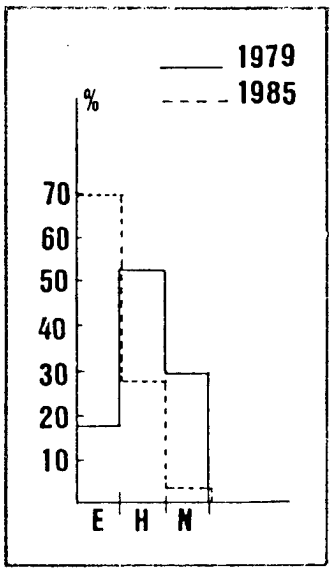


Figure 3: Load capacity

Type of Power Source

Systems using electrical power sources provide the greatest ease and simplicity. Electricity's suitability for control and advances made in recent years in microelectronics are the causes behind today's massive use of electric motors, especially motors using direct current. The percentage of today's robots using electricity has risen from 17 percent to 70 percent.

There has also been a corresponding sharp decline in hydraulic power systems, and pneumatic systems are almost non-existent now, even though hydraulic systems do offer some features that are more highly valued than electrical systems in terms of mass power (power developed per unit of mass), and the effort developed-velocity relation. Their price, of course, is in proportion with these benefits (see Figure 4).



Key:

E: electrical
H: hydraulic
N: pneumatic

Figure 4: Type of power source

Table 1 gives the load distribution as a function of the type of power supply, with the data published by A. Liegeois and E. Dombre shown in parenthesis. In 1979 it was confirmed that while pneumatic robots were used mainly for light loads, electric robots covered a range of loads up to 50 kilograms, and hydraulic robots could be used for any load. At present, this load capacity-type of power supply relation is not so clearcut. There are both electric and hydraulic robots that can handle heavy loads, and pneumatic robots are practically unavailable on the Spanish market now.

Repetibility

At present, the major part of the robot population available on the market offers a precision in repetition under $\pm$ 0.5 mm, and is capable of manipulating loads of up to 100 kilograms (see Figure 5).

The most common type of robot offers a repetibility under $\pm$ 0.5 mm, while manipulating loads up to the medium range, whereas robots which transport

loads over 30 kilograms operate in the 0.1 + 2.5 mm interval, depending on the task's requirements.

Power Supply / Load Capacity (kg)	Electrical	Hydraulic	Pneumatic
C < 1	3,5% (2,5)	— (—)	— (7,6)
1 ≤ C < 5	7% (2,5)	3,5% (1,7)	— (8,4)
5 ≤ C ≤ 15	28,5% (6,7)	12,8% (21)	2,9% (10,1)
15 < C ≤ 30	9,9% (2,5)	1,7% (9,25)	— (0,85)
30 < C ≤ 50	5,2% (3,35)	0,5% (10,1)	— (—)
50 < C ≤ 100	14,5% (0,85)	7,6% (11,75)	0,5% (—)
C > 100	0,5% (—)	1,1% (—)	

Table 1

The number of degrees of freedom is also related to the repetibility, as the final error will be an accumulation of the errors due to each displacement, whether linear or angular. Almost all robots with a repetibility under ± 0.1 mm have three of four degrees of freedom, while robots with a repetibility over ± 1 mm have five or more degrees of freedom. Finally, it should be pointed out that the great majority of robots available with more than five degrees of freedom have a repetibility under ± 0.5 mm.

Conclusions

The following points have been drawn from a comparative study of the structural characteristics of the robots available in Europe in 1979 and in Spain in 1985, and from the classifications adopted.

a. The vast majority of robots now have six degrees of freedom (three for the hand), and therefore versatility is their most favored characteristic from this point of view. In addition, they can easily be adapted for other forms of movement. This improvement in maneuverability will help them to avoid obstacles and make bypasses.

b. For the arm's structural configuration, almost half of the robots now available are of the angular type. This happened in 1979 with robots with cylindrical coordinates. The selection of the arm's structural configuration depends on the application for which the robot is intended; the new tasks which it may be

assigned, and the various characteristics associated with these tasks, such as load, velocity, etc. have also helped to create this fluctuation.

c. Robots which work with light loads still predominate, but their repetition precision has been improved, and is now under $\pm$ 0.5 mm.

d. The advantages offered by direct current electric motors in terms of control have brought about their massive use in present-day robots, even for heavy loads, replacing hydraulic systems.

e. While the standard robot in 1979 was a cylindrical robot with five or six degrees of freedom, a load capacity between 5 and 15 kilograms, a repetibility between $\pm$ 0.5 and $\pm$ 1 mm, and powered by a hydraulic motor, today the most typical robot prototype has the following features: angular, with six or more degrees of freedom, it manipulates loads under 30 kilograms with a repetibility under $\pm$ 0.5 mm, and is powered by a direct current electric motor.

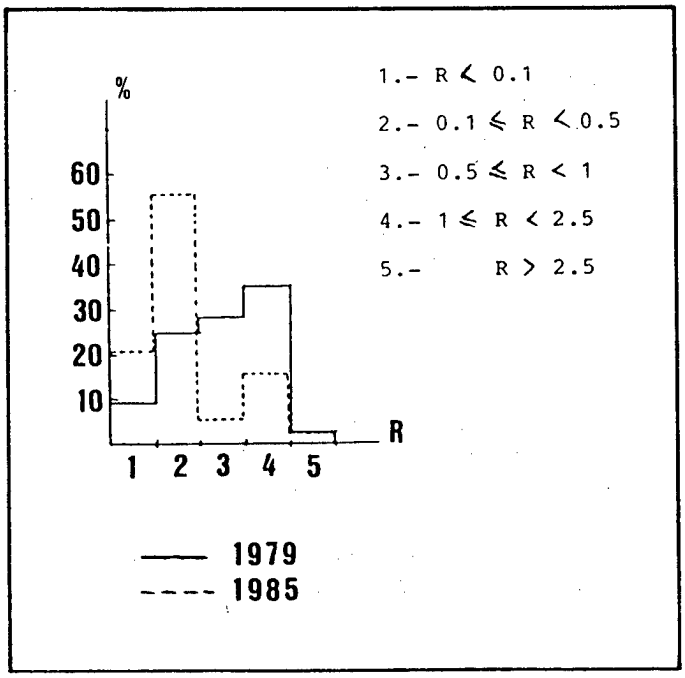


Figure 5: Repetibility

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WEST EUROPE/FACTORY AUTOMATION

SPAIN'S 'UNIDAD HERMETICA, S.A.' ENTERS FACTORY AUTOMATION

Barcelona REVISTA DE ROBOTICA in Spanish Nov-Dec 85 p 21

[Text] A new engineering firm has just been founded, named "Unidad Hermetica Centro de Informatica y Robotica, S.A." ["Unidad Hermetica" Information and Robotics Systems Center]. It plans to offer a broad spectrum of services in the areas of automation, process control, robotics, assembly, computer-controlled FMS [Flexible Manufacturing Systems], and industrial information systems.

The services available include all phases of a turnkey project: design, construction, adjustments, initial operation, and maintenance of the systems.

"Unidad Hermetica Centro de Informatica y Robotica, S.A." is a member of the "Unidad Hermetica, S.A." group, known as Spain's leading manufacturer of hermetically sealed motor-driven compressors and refrigeration equipment. It has two plants in the Barcelona area (Sabadell-Snt. Quirze). About 64 percent of its production--about 3 million compressors a year (1985 data)--goes to foreign markets. Internationally, it is considered one of the five leading compressor manufacturers in the world.

Its high-tech production systems and the skill and expertise of its staff have in recent years easily enabled it to assimilate new technologies in its various areas of production: presses, dies, casting, mechanical work, thermal treatments, welding, assembly, etc., thus helping it to keep its competitive position in international markets.

"Unidad Hermetica, S.A." is now offering the proven experience of its technical staff through this new engineering and applications firm, "Unidad Hermetica Centro de Informatica y Robotica, S.A." We at this journal hereby extend it our welcome, and express our warmest wishes for success in its endeavors.

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WEST EUROPE/SCIENTIFIC AND INDUSTRIAL POLICY

ITALY'S TEN-YEAR AID PROGRAM FOR RESEARCH, DEVELOPMENT

Milan MACCHINE in Italian Jan-Feb 86 p 53

[Text] Government and Parliament alike seem to be increasingly committed, partly in response to continued pressure from the sectors most concerned, to extending aid and incentives to companies planning to keep pace with advancing technologies through purchase of machinery that can introduce innovative processes into production here.

In November came final approval of what is known as the Citaristi Bill) which,briefly stated, appropriates another 350 billion lire for technological innovations in manufacturing firms and provides for a ten-year extension (from 1985 to 1994) of low-interest credit, earmarking 400 billion lire for the purpose and introducing a kind of "mini-reform" in this institution.

The measure is neither new nor unique in the view of "labor experts."

Among the more significant legislation in this area to date have been, in addition to PL 675 (adopted in 1977, which calls for industrial reconversion and restructuring),, DPR 902, and PLs 46 and 696, passed in 1983 and 1983, respectively.

With passage of PL 46 came establishment of the Fund for Technological Innovation, with appropriations of an initial 1,500 billion lire over a period of 3 years which, according to reliable estimates, gave the go-ahead , during that same period, for investments in industry amounting to 6,000 billion lire to be spread among the automotive, chemical, electronics, and computer technology sectors.

Another 100 Billion to Enterprise

With PL 696 the idea was to appropriate another 100 billion (subsequently increased) for small and medium companies to finance purchases of high-tech machine-tools, but emphasizing "targeted" intervention, inasmuch as the law tasked the Interministerial Committee on Industrial Policy Coordination (CIPI) with stipulating the kinds of machinery that would be eligible for help, and restricting them to a circumscribed category. In other words,

those qualifying would have to be electronically controlled and operated and serving to automate production processes in the areas of processing, measurement, versatility or ease of handling and stowage of equipment; mechanical or electronic apparatus for automating operator- manned machines, and electronic devices for command and control of worker-operated machinery.

Substantially, the new provision, which, among other things, governs the utilization for innovative purposes of funds set aside under PL 675, otherwise destined to wind up in the debit-side pot, steps in to extend eligibility to those who had been excluded, for example, from the benefits of PL 696, to apply for government help. Practically speaking, new applications will not be expedited, but steps will be taken first of all to deal with long-pending applications from those who, having filed full documentation with their applications several years ago, had not received any subsidy because the funds had been exhausted.

Salient Points in New Law

Let's look at the more salient points of the new law which, among other things, extends low-interest credit from industry to include the smaller, artisan operations.

-- Updating the procedures called for under DPR 902 will make access to low-interest loans easier for industry; it calls for abrogation of the occupational standard for obtaining financing for corporate modernization plans and, above all, updates the level of investment and capital investment (that comes to 20 billion for new industrial plants and to 8 billion for expansion of existing plants);

-- standing to lose the subsidies are companies who have not initiated investment for which they had been granted east financing terms;

-- DPR 902 (easy credit) will be refinanced with 40 billion per year for a 10-year term, but it will cease with depletion of the endowment fund;

-- Newly eligible for DPR 902 902 benefits will be artisan operations in mining or manufacturing, provided they make investments amounting at least to 500 million lire.

With the funds already available under PL 675, the law provides for refunding PL 696 and for beefing up the special fund set up under PL 46.

Specifically, under PL 69, 200 billion will be set aside over a period of 3 years so as to guarantee, as noted earlier, approval of all applications for financing (15,000 of them in 2 years) submitted by 30 April 1985, a deadline that was not extended.

Bear in mind, however, that the recently approved legislation makes no provision for an increase in government funding for 1986 on behalf of venture capital and for real services to businesses.

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WEST EUROPE/SCIENTIFIC AND INDUSTRIAL POLICY

FIAT'S AGNELLI REPORTS POSITIVE 1985 PERFORMANCE

Turin ILLUSTROFIAT in Italian Feb 86 p 3

[Text] The Board of Directors of Fiat S.p.A, with Giovanni Agnelli presiding, met on 21 January to look at the preliminary report on the firm's performance in 1985.
In the letter to shareholders, which contains the conglomerate's important data, Fiat's president announced that 1985 ended with a bottom line far more agreeable than the fairly good one for 1984, despite the persistence of an external climate of trouble and uncertainty, both in the economy as a whole and in the major markets in which Fiat is active.

"The sum total of these external factors," the president said, "led us to hew tightly to the lines of corporate policy already laid down in the past: efficient use of plant to assure and increase our competitive standing and our ability to generate profits, a tight hold on the budget to guarantee an adequate margin of safety; innovations in processes and products to deal creatively with continually increasing demand."

The soundness of Fiat's options is supported by the initial estimates of the combined performance of the company's divisions in 1985

"Particularly striking," Agnelli said "is the fact that every division of the group has contributed to this gratifying report."

Going on to an overview of the economy in 1985, the Fiat president underscored the fact that the Italian situation had not come up to expectations.

"The difficulties besetting the Italian system," he added, "are reflected in the behavior of the trade and payments balance: despite the recovery in the second half, 1985 ended with deficits and with a rather painful impact on the level of foreign debt and of the reserves."

The experience of 1985 counsels prudence as to expectations for 1986.

"Nothing but final formulation of the financing laws," Agnelli said, can tell us whether or not our economy is strong enough

to engage the process of adjustment that is the indispensable premise for achieving development goals better attuned to the nation's needs."

Here is the performance analysis for the individual divisions as set forth in the letter to shareholders.

Automobiles

On the Italian market, which had shown about 7 percent growth over the previous year, Fiat Auto held a decisive lead with a 52.2 percent share. Crucial to that victory was the success of our Model 1s (which gained new momentum with the Fire version), Panda, Ritmo, and Prisma, among the top seven best-selling models.

The Lancia is among the top-selling makes on the Italian market with 165,000 cars sold and registered, thanks to the success of the Thema and expansion of the range of choices with the Y 10.

Industrial Vehicles

Demand for industrial vehicles in Europe has grown by 3 percent (to 385,000 units), with increases uneven from country to country.

A detailed examination of the situation in various markets shows a 7-percent increase in the Italian demand for vehicles weighing over 3 tons, and total Iveca sales amounting to 34,371 units (up 13.5 percent over 1984). The overall market-penetration has increased from 59.8 percent in 1984 to 61 percent.

Farm Tractors

The world demand for farm machinery has once again reflected the downward trend of the past few years.

In that context of soft markets, excessive production capacity, and superheated price-wars, the automotive division has made major advances in 1985, consolidating its position as Europe's top producer.

Earth-Moving Equipment

The world market for earth-moving machinery, in our major product lines in 1985, ended after the slight recovery last year, with a mild decline.

In this troublesome context Fiatallis boosted sales of complete units, moving from 6,385 units in 1984 to 6,755 units in 1985 (a gain of 6.6 percent).

Metallurgical Products

1985 was remarkable for substantially steady levels of demand and sales in the second half of 1984. The division was aiming at a target of consolidating the previous fiscal year's performance, boosting shipments (tons of finished product) from Teksid and Brazilian FMB by 4 and 8 percent over 1984.

Components

In the vehicular sector, fairly brisk sales fueled an 8 percent growth-rate. In the non-vehicular lines, there was an 11 percent increase with rising orders.

Production Tools and Systems

The division's order-books at year's end showed over 1,100 billion lire, with aquisitions of more than 800 billion in the course of 1985, about 60 percent of which came from foreign clients.

Civil Engineering

The market for major engineering construction projects showed no variance in the overall scene of sluggish demand.

Despite the currently difficult situation, the major construction companies, which have undertaken an organizational restructuring, managed in 1875 to handle acquisitions of some 2,500 billion lire, a marked improvement over the precious year.

Railroad Products and Systems

F Ferroviaria Savigliano has taken orders for 180 billion lire for the year, winding up with a portfolio worth 430 billion lire. The division's activity over the year had to do with both developing orders for rolling stock for the National Railroad and with soliciting orders for urban transport in the areas of Milan, Turin, and Rome, and from the franchised rail carriers.

Aviation

During 1985 the company, in addition to continuing its planning and production activities, developed a far-reaching investment program, most of it centered in research and development.

Nuclear Power

In 1985, Fiat Termomeccanica booked orders for nuclear componets and power plants for ENEL's installations.

In the gas turbine field, despite the fact that the world market is still none too warm toward the technology, Fiat Termomeccanica got orders in the nuclear area for components and plants from the Pakistani Electric Power Agency calling for a 200K turbogas power station with two TG-50 gas turbines.

Telecommunications

Demonstrating a trend toward steady expansion, Telettra reported overall profits with marked increases over 1984.

Total earnings were 475 billion lire, an increase of 15.3 percent over the previous year, 52 percent of it earned in Italy and 49 percent earned abroad.

Bioengineering

In 1985 the market chalked up a real rate of growth somewhere between 6 and 8 percent, maintaining its solid record over the past several years.

The division's overall billing rose by about 30 percent over 1984, and sales abroad accounted for 48 percent of the total.

Publishing

Last year was one of steady advance for the divisions in this sector.

L'Editrice LA STAMPA billed more than 67 billion lire for single copies sold, an increase of 5.3 percent over 1984.

Publikompass in 1985 billed some 104 billion lire for printing brochures and handbills (up 10 percent over 1984).

LA ECO -- Communications for Industry -- billed about 26 billion lire in 1985.

Tourism and Transportation

In 1985, Ventana did 195 billion lire worth of business, an increase of better than 20 billion in the tourist department, and successfully held its volume steady in trucking and hauling.

Fidis --A number of sizable and profitable operations were completed in 1985, in connection with the participation portfolios.

Upon completion of these operations, the value of the share portfolio came to 248 billion lire (223 billion as of 31 Dec 1964).

Financial Services Divisions

Our financial services companies operating in Italy and abroad report a volume of business in connection with loans, leasing arrangements, and financial services, of better than 12,600 billion lire (as against 11,700 billion in 1984). Volume for companies operating abroad came to more than 6,200 billion lire.

FIAT'S UP-BEAT ANNUAL REPORT

DIVISIONS	BILLING 1985 vs 1984 (in billions LIT)	
AUTOMOTIVE	1985	1984
Automobiles	13,950	12,878
Industrial Vehicles	5,241	4,575
Farm Tractors	2,135	1,951
Earth-moving Equipment	1,048	1,010
Metallurgical Products	1,028	945
Components	3,300	2,539
Production Tools and Systems	659	580
Civil Engineering	340	400
Railroad Products and Systems	159	144
Aviation	443	372
Nuclear Energy	180	203
Telecommunications	475	412
Bioengineering	156	122
Publishing	206	197
Tourism and Transport	261	242
Miscellaneous	287	379
TOTAL	29,868	26,949
Inter-Divisional Transfers	(3,538)	(3,136)
Consolidated Billing, All Divisions	26 330	23, 813

6182
CSO:3698/398

WEST EUROPE/SCIENTIFIC AND INDUSTRIAL POLICY

NFS: 0.1 PERCENT OF GNP TO SUPPORT NORDIC RESEARCH COOPERATION

Copenhagen AKTUELT in Danish 4 Mar 86 p 19

[Article by Jorgen Placing: "Nordic Trade Unions: Strengthen Cooperation in Biotechnology"]

[Text] Export and technology. Those are the keywords of the trade unions when Scandinavian cooperation is mentioned. Without cooperation in these areas, the Scandinavian countries will lag behind.

The Scandinavian trade unions suggest, in a new trade-political report, that greater efforts should be made towards technological cooperation, so that the Scandinavian countries will be able to compete successfully with the large industrial countries. A tangible proposal, for instance, is cooperation in the area of biotechnology.

But those activities cost money. That is why the Scandinavian trade unions are pushing for more money for the joint Scandinavian operation.

NFS--the Council of Nordic Trade Unions--published the report which, together with a statement from NFS, was presented to the 34th session of the Nordic Council at Christiansborg in Copenhagen.

Six-fold

The Scandinavian trade unions want the Scandinavian countries to apply much more money towards Scandinavian activities and are suggesting a six-fold increase in the current budget for the Nordic Council.

NFS suggests that the Scandinavian countries apply 0.1 percent of the GNP towards the Scandinavian cooperation. In a short period of time then resources would be increased to about 2 billion Swedish kronor--or six times as much as today.

At a press conference yesterday at LO (the Danish Federation of Trade Unions), representatives of NFS could not say how the individual countries were to come up with the increased funds for the Scandinavian cooperation. Sune Ahlen, secretary-general of NFS, pointed out that that must be decided by the countries themselves.

Martin Romer, vice-president of NFS, emphasized that there is not enough progress in the trade policies of the Scandinavian countries. Nor is the cooperation good enough. In spite of advances in employment in several of the Scandinavian countries, Martin Romer maintained that unemployment is still too high. In regards to women and laid-off workers in particular, the situation worsened from 1985 to 1986.

Crossroads

According to the trade union, Scandinavian business is at a crossroads. Either the Scandinavian economies are going to fall behind in relation to the large industrial nations, or else a policy ought to be decided on which would enable the Scandinavian countries to keep pace with the competition, especially in the areas of advanced technlogy and product development. Which road the development will take depends on, among other things, how well the Scandinavian countries are able to cooperate. According to NFS, the Scandinavian countries individually are too small to compete successfully. The thought is that joint efforts will bring success.

Kaj Vangskjaer, an economist in the Worker Movement Trade Council, is one of the Danish participants in the group that prepared the trade-political report, and he attaches the greatest importance to the very message of the report: cooperation pays. Cooperation within technology and export is the most important factor. Concerning biotechnological cooperation in particular, Kaj Vangskjaer says: "All countries--especially the large ones--are investing heavily in this area. There are great prospects in a cooperation between the Scandinavian countries within biotechnology. The Scandinavian countries--especially Denmark and Sweden--have very able people in this area--and progress lies in better utilization of the resources.

Research Programs

"One can envision Scandinavian research programs that produce a larger knowledge base and which also give us a feel for where the greatest efforts are needed. There are exciting prospects for the green area--agriculture."

NFS suggests that the Scandinavian countries establish an institute which can cooperate in the technological field, establish cooperation in research and establish opportunities for information and training activities.

NFS also suggests joint initiatives in connection with development in the data field--programs based on Scandinavian requirements of the work place, the work environment and democracy.

In the plan of action, which was agreed upon by the Scandinavian governments at the Nordic Council Session last year, it was decided that the work line, i.e., productive work should be offered to the unemployed, should be put ahead of the contact line. This objective has not been pursued by the national employment programs of the governments.

NFS views this as a deviation from important principles and as not acceptable. It is pointed out, among other things, that the training area might produce greater resources in the coming years.

12339/12795
CSO: 3698/376

WEST EUROPE/SCIENTIFIC AND INDUSTRIAL POLICY

FRENCH PRIVATIZATION PLANS, FOREIGN INVESTMENT CONTROLS

Paris L'USINE NOUVELLE in French 17 Apr 86 pp 61-62

[Article by Marie-Jeanne Pasquette: "Privatization: Directions for Use"]

[Excerpts] The principle of privatization is well-established. It will probably happen to at least one financial company before September (Paribas is in good position) and to three industrial groups which could be: the Compagnie Generale d'Electricite, Saint-Gobain, and Rhone-Poulenc in that order. The latter's president, Loik Le Floch-Prigent, has made no secret of being in favor of privatization, he has even estimated his company's value at Fr 12 billion.

Will the Paris Stock Exchange, whose capitalization is close to Fr 950 billion, be able to mobilize the additional Fr 150 to Fr 200 billion needed to take over the nationalized companies from the state: It is, in fact, a question of finding Fr 20 to Fr 40 billion per annum for 5 years if the privatization program is fully implemented. These are minimum figures since they do not take into consideration the new appetite for funding which certain denationalized and undercapitalized companies are sure to reveal. Compared with the volume of new share issues reported in 1985 (Fr 68 billion), the outlay required from investors is considerable. However, the government has planned certain measures which will be adopted before autumn and which will facilitate the issuance of shares on the market.

Technically, the denationalization process should sweep out of its way all the legal and fiscal obstacles it meets. But there are other problems. For instance, how to prevent foreign investors from taking control of French industrial groups? That is where the problem lies. Siemens, the European number one in electrical engineering, which is sitting on a buffer of Fr 150 billion of its own funds, is keeping a close eye on CGE [General Electric Company] and Thomson, groups whose activities to a certain extent complement those of the German firm. The government has been reassuring on this point.

In the RPR-UDF's [French governing coalition] plans, foreign groups were not to be allowed to acquire more than 20 percent of the capital of companies destined for denationalization. In theory, the goal seems easily attainable. But one in office, the departments working for Camilla Cabana, the new

minister for privatization, realized that this plan would require efficient controls. Their studies seems to tend towards a legal device called "golden share" which would allow the arrival of foreign investors to be monitored. The state would keep at least one share of the company's capital and certain rights would be attached to this share for a period limited to a few years. In particular, it could refuse the transfer of certain assets or even choose the manager's nationality. This formula, which comes from across the Channel (it is used by Jaguar and Cable & Wireless), does not, of course, stop the government from laying down rules on foreigners' access to privatizations, but above all, it gives it the means to ensure they are complied with.

Table 1. Ten Industrial Groups To Be Privatized

Group	Turnover	State share in capital (in %)	Profits 1985 (1)	Value of net assets end 1984 (1)	Estimate of the value of privatization (1)
Bull	16.1	95	+0.11	1.2	3.8
CGCT [General Company for Telephone & Engineering]	2.8	100	=0.2	-	-
CGE	78.5	100	+1.0	7.0	10.8
Dassault	16.4	46	+0.43	2.8	14.5
Elf	180.7	67	+5.3	43.5	23.3
Matra	14.5	51	+0.07	1.7	3.3
Pechiney	36.0	81	+0.75	8.4	4.0
Rhone-Poulenc	56.1	91	+2.3	9.9	19.8
Saint-Gobain	66.7	100	+0.75	10.8	11.8
Thomson	59.0	100	+0.45	2.8	9.9

(1) In billions of francs

What is the value of the industrial groups which will be given back to the private sector in the next 5 years? The value of the net assets based on the results of the 1984 fiscal year, indicated in the above table, given an initial assessment. But it is insufficient. Another evaluation method has been used. For companies quoted on the stock exchange (Matra, Dassault, Elf), the [stock market] quotation of the share multiplied by the total number of the company's securities gives an estimate of the privatization value. In the case of CGE, the value of the 1985 profit multiplied by Siemens' PER (Footnote 1) (PER: Price Earning Ratio, i.e., the value of the company's shares estimated at the day's quotation divided by the last known profit.)--the leading European company active in the same sector and therefore comparable--gives a satisfactory approximation. For Bull, the same calculation can be made with Nixdorf's PER. The value of the other groups has been calculated by taking their net 1985 profit multiplied by the average PER of their sector as quoted in LE NOUVEL ECONOMISTE of 25 Mary 1986.

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WEST EUROPE/SCIENTIFIC AND INDUSTRIAL POLICY

BRIEFS

ITALIAN FIRMS JOIN ESPRIT--As part of the EEC program known as Esprit, the EEC has approved a new robotics reaearch program in which three Italian companies will be active: OCN Systems (an Olivetti subsidiary), Comau (a Fiat subsidiary), and Sincom of Rome. The idea behind the project, which will also involve Stockholm's IPA Institute and the Siemens Research Center in Munich. is development and production of several devices which could endow industrial robots with coordinated sensory capabilities. These robots would possess not only sight, touch, and hearing, but would be equipped with a processor capable of coordinating incoming signals from the sensory organs and using them to generate, on its own circuits, a three-dimensional image of surrounding objects, Siemens and Sincon will contribute their expertise in vision, while IPA's input will be its experience in the tactile sensory field. Hearing will be simulated by a device that measures distance to target, rather like Sonar. OCN Systems' and Comau's assignment is to prove that the system will work in practical applications to robots. [Text][Ivrea NOTIZIE OLIVETTI in Italian Dec 85 p 3] 6182

OLIVETTI/SEIKO IN NEW VENTURE--The two companies have formed a new company in which each will hold a half-interest in producing flat liquid-crystal screens for use in various sectors of computer and automotive technology. The new company will be called Tecdis, and will utilize technologies developed by Seiko It will base its production in Italy and market the devices throughout Europe. [Text][Rome TELEINFORMATICA 2000 in Italian 20 Jan 86 p 3] 6182

CSD: 3698/398

WEST EUROPE/TECHNOLOGY TRANSFER

EC ENCOURAGES JOINT VENTURES WITH JAPAN

EC Strategy for Technology

Stockholm NY TEKNIK in Swedish 12 Dec 85 p 7

[Article by Staffan Dahllof: "EC Welcomes Swedish Technology"]

[Text] Copenhagen--Cooperate readily with Sweden, but watch out for the United States!

These veiled suggestions can be found in a European Parliament resolution about EC strategy for the application of new technology.

A joint technology policy must become one of the cornerstones of EC. This is the leading idea behind the resolution, which was recently adopted by the European Parliament in Strasbourg.

The resolution makes no less than 50, more or less specific, demands on the government of the EC-countries.

Among them is an urgent request to expedite the so-called Eureka-project, which was initiated by France.

In that connection, the following is entered as a special point: "It is pleasing that non-member countries are involved in the cooperation." No countries are mentioned by name, however.

Vague Criticism

The resolution does not mention specifically the technology embargo on the part of the United States, but, indirectly, the members of the Parliament urge the member-countries to cooperate with Japan rather than with the United States.

The demand is, literally, "that the Community (EC) does not miss out on any technological advances as a result of restrictions of technological transfers, because of participating in joint ventures with companies from countries with such preposterous regulations; and that joint ventures with companies from countries without such regulations, i.e., Japan, should take precedence."

The criticism of the embargo policy of the United States is more vague here than in the proposed resolution which was tabled earlier (NY TEKNIK 1985:48).

Strengthen the Positions

The statement about a technology strategy mentions that EC is in a strong position as far as energy research and telecommunications are concerned, but that the position ought to be strengthened in biotechnoloby, ocean technology, new materials and microelectronics.

The space organization, ESA, the manufacture of the Airbus, the experiments with fusion energy and the Esprit program for electronics were mentioned as positive examples of existing cooperation.

The resolution enjoins the parliamentary committees for energy, research and technology to report annually on how far Europe has come in its efforts to catch up with American and Japanese technology.

Esprit Participation Encouraged, Restricted

Stockholm NY TEKNIK in Swedish 12 Dec 85 p 2

[Article by Staffan Dahllof: "Admit Swedish Technology Into EC"]

[Text] Copenhagen--"Allow Swedish companies to participate at their own expense."

This advice refers to EC's ten year-old research program on information technology--Esprit.

An expert committee which has evaluated the first two years of Esprit (European Strategic Program for Research and Development in Information Technology), is behind the request.

Esprit is the flagship, among the various efforts, on the part of EC to strengthen European technology in relation to technology from Japan and the United States.

Companies and institutions that are able to agree on joint development projects, can get half of the costs paid for by EC. Companies from at least two different EC nations must participate in each project.

So far, one Swedish company has slipped through the eye of the needle: Ericsson's West German subsidiary is taking part in the coordination of computer keyboards for future office systems.

"We are now suggesting that Swedish and Norwegian companies with something to offer, should be allowed to participate, even though they don't pursue research

and development within EC. On the other hand, they should not count on receiving direct grants," says Professor Hans-Jurgen Warnecke, one of the three experts who evaluated Esprit.

The committee gives high marks to Esprit, but also offers this criticism:

Projects concerning household electronics, opto-electronics, and surrounding equipment for computers are lacking. The bureaucracy surrounding the project applications is extensive. The daring and visionary proposals are conspicuous by their absence.

The three experts don't dare to prophesy whether Esprit really does contribute to a rekindling of European technology.

"But the participants are positive and the interest is growing. For each accepted application, two must be rejected," says Professor Warnecke.

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WEST EUROPE/TECHNOLOGY TRANSFER

SPANISH-POLISH CIVIL AVIATION DEAL

Madrid DIARIO 16 in Spanish 11 Mar 86 p 20

[Text] Warsaw. Spain and Poland are making preparations for the joint development and manufacture of a passenger plane based on the CN-235 manufactured by the Spanish firm CASA [Aeronautic Construction, S.A.].

The Spanish-Polish negotiations for this industrial cooperation agreement have now reached their final stage and a contract "may be signed before the summer," diplomatic sources in Warsaw told Efe, the Spanish press agency.

Braulio Robles, Spain's commercial attache in Poland, said that both parties are very much interested in this project for a 60-seat plane, which would almost double the capacity of the original version, which can carry a maximum of 35 passengers.

The Polish airline Lot would use this new model to renovate its antiquated fleet of Soviet-built Antonov-24, which are used for domestic flights and for short flights to other socialist bloc countries.

Earlier, CASA had been negotiating for some months with Lot for the sale of 35 CN-235, equipped with two turboprops, costing US $5 million per plane. This proposed sale did not go through, as Lot wanted a model with a larger seating capacity.

Poland's debt to Spain, calculated at $80 million, may have indirectly created some difficulties in financing this big Spanish-Polish deal, some observers suggested.

The model they now plan to develop will cost about $6 million and will apparently be outfitted with two Canadian-built Havilland engines.

7679
CSO: 3698/400

EAST EUROPE/AEROSPACE

SOVIET INSTITUTE DIRECTOR DISCUSSES SPACE PLANS

Warsaw PRZEGLAD TECHNICZNY in Polish No 8, 23 Feb 86 pp 12-13

[Interview with the director of the USSR Academy of Sciences Institute of Cosmic Sciences, Professor Roald Zinnurovich Sagdevich, by Jerzy Jacek Tomczak: "Invitation to the 4 March Transmission"]

> [Text] Jerzy Jacek Tomczak interviews a participant to the Congress of Intellectuals in Defense of Peace, Roald Zinnurovich Sagdevich, director of the Institute of Cosmic Sciences, USSR Academy of Sciences.

[Question] Is there any special significance in the fact that you, the director of the Institute of Cosmic Sciences, are a participant to this congress?

[Answer] Yes, this is no coincidence. As a scientist and citizen, I want to take at least some small part in in the peace movement but what most inclined me to come to the Congress was my specialty, the danger of outer space becoming an arena for the arms race. The Warsaw forum is being attended by people from the two mainstreams of intellectual life: scientists and artists. That in itself is interesting. Scientists certainly possess greater knowledge and are better informed about the dangers of war but artists can accomplish much because of their enormous influence over the masses.

[Question] Please tell us about progress in space research. What are the trends that will be followed by Soviet experiments in outer space?

[Answer] Orbital stations have already become our traditional method of research and we will continue using them while continually adding the newest technical ideas. But this does not mean that we will not be using other methods such as reusable space vehicles.

[Question] Space shuttles?

[Answer] Yes. They allow us to accomplish other tasks. The two methods complement and supplement each other. The problem is whether for economic and other reasons it is worth employing American ideas. Let us take a closer look

and analyze their results. Opinions are varied. For example, I myself do not have such an optimistic outlook on their experiences.

[Question] Why?

[Answer] Their technical concepts have been realized but the idea of creating a less expensive (or as they say, cost-efficient) system of space transportation that can carry one kilogram of payload at a lower cost has failed. Their costs have been 10-15 times higher than expected. We still do not know exactly why the system has turned out to be so expensive but we can be sure that the time overrun is much to blame. Aside from this, the system's reliability leaves much to be desired. The launch date for the shuttle now in orbit was postponed 8 times (author's note: the shuttle landed the day after this conversation was held, but in a different place than planned).

In October, a young congressman from Florida, Bill Nelson, visited Moscow. He is the chairman of the House Subcommittee on Space Research and he told us that he will be part of the shuttle crew for a flight in December. This impressed me a great deal and I shared his enthusiasm for the trip. We talked about this a lot in Moscow as well as the idea of cooperation in space and what happened? The flight was postponed by nearly one month.

[Question] Speaking of cooperation, I have heard news about plans for a joint Soviet-American flight to Mars.

[Answer] That is an interesting matter, perhaps not something that can be arranged at this time, but it is a great concern for people involved in cosmonautics. In the beginning, the space research program was greatly hurried. Within a decade of the first sputnik, we managed to fly to the moon. After that, the pace and scope of space research was somewhat reduced and we began to think about far-reaching goals. In the future, we hope to use closer regions of outer space for economic and commercial purposes but the plan that most stirs the imagination of people on Earth is a joint international flight to Mars. From a technical point of view, this is an entirely feasible project. It would be quite expensive and experts estimate the costs at 50-100 billion dollars. However, that is little in comparison to what Star Wars could cost. If we decide to carry out such a project, I think the flight could be made sometime within the first 25 years of the next century. Just imagine everyone on Earth following the flight breathlessly. This is something that brings people together.

I believe that international cooperation, especially in space, can create a psychological bond between peoples and all of us in our different countries feel that space is our common treasure and that Earth is only a small part of the universe. The United States already has a sizeable lobby for such a trip even though this is something for the distant future.

[Question] No earlier joint flights are being planned?

[Answer] Two American senators, Spark Matsunaga from Hawaii who is my good friend and Jake Garn from Utah who was supposed to take part in a shuttle

flight, have made an interesting proposal. They want to see 1992 declared the International Space Year, coordinate a program of special research on Earth's resources and perhaps even work out special programs that would aid developing countries.

[Question] To determine their resources?

[Answer] Not only that but also work out programs for the growth of telecommunications and education. They want to see so-called educational satellites. It is worth pointing out that in the draft of the resolution proposed by these senators, the choice of the year 1992 is far from coincidental. This is an important date for our countries because America will then be celebrating the 500th anniversary of its discovery by Columbus and we will be observing the 75th anniversary of the Bolshevik Revolution.

[Question] You spoke about the practical significance that international research plans have for third-world countries. Considering the decisions of the most recent session of the Council of scientific and technical progress, could you tell us what their practical value they hold for the USSR and the other CEMA nations?

[Answer] It has turned out that the resolution on the five basic directions for scientific and technical progress determined during the session never mentioned space but only referred to it indirectly. If you take the example of electronics, everyone knows the enormous role taken in that science by data-processing. The future of data-processing is closely connected with space because even today, satellite telecommunications is of great importance. You can imagine that in the future, all of our nations will be connected by an enormous supernetwork of mathematical machines and the most important flow of information will be exchanged by computer networks over space.

Furthermore, we can see how space research is being used in such areas of our joint program as biotechnology. Weightlessness offers better conditions for carrying out certain experiments and then for the production in space of biotechnological, microbiological and pharmaceutical products. The list of what can be done in space is very long. We can already say now that it would be hard to imagine life without telecommunications satellites. Consider how much marine transport relies on these satellites for navigation purposes. Almost all large ocean-going ships are equipped with technology enabling them to use satellites to determine their bearings at sea. These satellites actually function as radio lighthouses. Meteorology also employs them. We may often complain about weather forecasting but satellites have improved improved the accuracy of weather predictions. We can still observe a certain amount of inertia in the study of earth's resources. Geologists, agricultural services and hydrologists are too slowly giving up the old methods and are not making adequate use of information coming from space. That too will inevitably change.

The experiences that biotechnology and pharmacology have had with new materials can also be applied to other areas such as electronics and optics.

[Question] Do the tests now being conducted on Halley's Comet have any practical significance?

[Answer] They are of great human value. This is the first time in human history that we have been able to take a close look at a space object that has intrigued man for centuries. This research is also of great value to the primary sciences. Their is also the practical aspect of the comet studies. The conditions for meeting the comet have been extraordinary because in 1984, when the Vega apparatus was launched, the comet's exact orbit was still unknown. We therefore had to plan on altering vehicle flights as we received newer data about the comet's orbit. The Vega apparatus will fly at a speed of about 80 km per second through the comet's tail. At such a velocity, one gram of dust from the comet's tail will impact with the force of a missile explosion. For a few billionths of a second, the point of impact will feel pressure on the order of 100 million atmospheres or 100 megabars. Furthermore, once this vehicle has reached the comet's atmosphere, we will no longer be in control of it because everything will take place too quickly so Vega had to be equipped with certain elements of artificial intelligence. I think that these new technical ideas will find great practical uses in the future. I must also point out that many of us felt a certain nostalgia because Halley's Comet has always been associated with various superstitions. Every time the comet has appeared, it was followed by wars, battles and epidemics, therefore our study of it at its closest passage to Earth may be a unique contribution to peace.

I would like to add that scientists from 10 different countries took part in this project. We soon expect to see an important American delegation at our institute in Moscow because there were many Americans that took part in this project and helped to prepare the experiments and the scientific instruments carried by Vega. Unfortunately, this project was not the subject of any agreement between governments as was the Soyuz-Apollo project but we did manage to work with certains laboratories and groups of scientists who have made a valuable contribution to the project.

[Question] And Polish scientists?

[Answer] The Vega program will conduct an experiment prepared by Polish scientists. With regard to that, I must say a few words about physics. During the comet's passage, there will occur a collision between two plasma streams. The first is the flow of solar radiation known as the solar wind and the second will be the constant plasma flow from the comet itself. This flow is caused when solar radiation ionizes cometary gases. These two flows will meet at enormous velocities and we will have an opportunity to study some very interesting phenomena. One of the effects will be very strong pulsation of the plasma and we can study that with an instrument built right here in Warsaw by our Polish colleagues. The instrument has already been in operation for a year because an important objective of the flight was also to study the solar wind on our approach flight to the comet.

Poland has an Intercosmic Council with which we have coordinated our actions. For many years we have enjoyed friendly relations with the council chairman,

Professor Jan Rychlewski. He is a genuine enthusiast of space research and an excellent scientist. We are also working with Professor Grzedzielski who directs a space research center and is a specialist on plasma and the solar wind. Several other Polish scientific institutes have cooperated in the construction of scientific instruments and the solving of certain problems. Our institute uses much Polish-made equipment, both items of general use and equipment designed for use in space research. These include the Mera minicomputers that are also used in many other Soviet scientific institutes. We use them to test instruments and to compile results.

[Question] Is there anything else you would like to say to our readers?

[Answer] On 4 March, we will begin direct transmission of the meeting with Halley's Comet. I promise your readers to inform them of everything that we learn.

[Question] I thank you in the name of the readers of PRZEGLAD TECHNICZNY.

12261
CSO: 2602/25

MEETING IN POLAND ON BIOTECHNOLOGY IN AGRICULTURE, FOOD INDUSTRY

Warsaw PRZEMYSL CHEMICZNY in Polish No 11, Nov 85 p 556

[Article by Tomasz Warszawski: "Exploiting Biotechnology in Agriculture and the Food Industry"]

[Text] A scientific-technical conference dealing with the application of biotechnology in agriculture and the food industry was held at the Academy of Economics in Wroclaw on 25 June 1985. This conference was organized by the Committee on Technology and Food Chemistry of the Polish Academy of Sciences (PAN) jointly with the provincial section of the Association of Food Industry Engineers and Technicians, the Wroclaw Academy of Economics, and the Wroclaw Agricultural Academy.

Participants included scientists from PAN and from educational and from scientific-research institutions that are involved in biotechnology as well as representatives of plants that use biotechnologal methods in production. Invited guests from Bulgaria, Hungary, and the USSR also attended.

Papers presented at the conference dealt with current work, the degree to which it had advanced and the problems that specific units had encountered. The principal problems cited pertained to the following:

--outdated apparatus or lack of apparatus (for example, bioreactors, biochemical analyzers);

--lack of a scientific information system;

--training of an adequate personnel pool;

--insufficient funds to purchase literature, equipment, and reagents;

--cooperation with world leaders in biotechnology.

Prof T. Golebiewski and Prof J. Sobieszczanski mentioned these problems in their presentations.

In addition, Professor Sobieszczanski spoke of an alarming situation in the Hirszfeld Institute where unique bacterial strains are maintained. It must be noted that the institute was already operating under exceptionally

difficult conditions when the economic reform was introduced. As a result of the reform, the financial condition of the institute was radically altered and the institute lost all possibility of being self-financed. Lack of funds may lead to liquidation of the collection of bacterial strains, which would be an irretrievable loss and would handicap future Polish scientific research.

Professor Golebiewski reported on the conclusions of the UN European Economic Commission meeting in Hungary, spring 1985, that dealt with biotechnology. The principal worldwide trends connected with development of biotechnology pertain to crop technology intended to increase food production, purification of effluents, and management of waste, biopesticides, sweetening agents and cellulose decomposing agents.

Prof E. Galas discussed the possibility of using enzymes in the food industry. At present immobilized (inactivated) enzymes are being used to obtain L-amino acids from racemic mixtures and to hydrolyze lactose in the production of syrups with high fructose content.

Professor Ustinnikov, USSR, called attention to the possibility of economizing on grain consumption and decreasing technological processing time by using enzymes in distilling and vinegar production.

Docent H. Michalski discussed modern automated bioreactors with high parameters of efficiency and reliability. He stressed that in view of the lack of suitable materials (for example, electrodes produced in Poland that would withstand sterilization temperatures), the country is experiencing difficulties in producing bioreactors.

Also discussed were problems connected with winemaking, the brewing industry, the alcohol and yeast industry and with exploiting biotechnological methods in veterinary medicine, for the preservation of fodder and in ecological studies.

2950
CSO: 2602/26

EAST EUROPE/BIOTECHNOLOGY

USE OF BIOTECHNOLOGY IN BULGARIAN AGRICULTURE, ANIMAL HUSBANDRY

Sofia TRUD in Bulgarian 27 Feb 86 pp 1, 2

[Article by Yanko Dolapchiev: "World class achievements are not so far off"; first paragraph is TRUD introduction, published in caps]

[Text] The microbial products factory in Peshtera is our only supplier of products for livestock and crop protection that are manufactured using biotechnology.

The conversation in the office of the director, Engineer Georgi Zhgumov, led off from the fact that the factory is still in the shadow of the antibiotics combine in Razgrad. "And that's because most people don't realize that what we produce is also for people," he said, with a hint of irritation creeping into his voice. "We too have contributed to the meat, the milk and the fruit."

He's right, because behind these words stand tons of medicines, biological additives and growth hormones, produced in the 25 years since the factory was built. They not only preserve the vitality of the livestock , but they also compensate for scarcities in the nutritional ingredients of fodder which nature herself would not be able to supplement. Production of meat, milk and eggs has increased. The biological products used for crop protection also have an effect on yields. In the final analysis, we are the ones who benefit -- the people.

From his brief orders and his remarks on the telephone: "I need a young person for this job, someone with initiative," it becomes apparent that the director is an efficient man. A little later, I shall see that almost the entire engineering and technical staff in the company is made up of young people.

The future directions of the microbial products factory were explained to us by Bozhidar Petkov, Deputy Director of Engineering and Introduction and Section Head of Development and Introduction. "Together with the scientific institutes our efforts are being directed toward introducing what is being produced in the world. That's not an easy task, irrespective of the fact that the raw materials for biotechnological production are cheap and on hand here. The scientific investigations and organization of work are more expenseive ... That's why they tell me, not without pride: "We earn a lot of hard currency, but we spend little!"

Antibiotics, growth hormones, lysine -- the indispensable amino acid in livestock feed -- these products are in demand. There is a great deal of interest in a product against leaf-nibbling caterpillars -- one of the rare occasions on which we are really not encroaching upon the environment and are not damaging our own health. Here the battle is being waged on a biological, not a chemical basis. The crops are sprayed with a solution containing protein crystals, formed in the cells of a special bacillus. Once in the caterpillar's body, these proteins destroy its digestive system. And the interesting thing is that, in other organisms, they inflict no harm.

Another significant advantage of products of this type for crop protection is that they lower the immune resistance of the pests, whereas the pests adapt to the effect of the chemical. The Peshtera factory will introduce a similar biological product in the struggle against mosquito larvae.

Last year regular production of glucose oxidase began -- a reactive to determine blood sugar in clinical investigations. And what else will the future bring? The past nomenclature will be proposed, but medicines, amino acids and enzymes will be better purified. The antibiotic, salinomycin, will be available for our veterinary medicine this year. Two new enzymes will also be introduced with applications in the food and tobacco industries and the pharmaceutical industry and for the production of toothpaste. There will also be a biological product for the struggle against field rodents.

As I walk around the factory, it becomes clear to me why the director insists on young people. The people I meet are around 30. The effort to hold on to new specialists is explicable. Apartments are guaranteed for them, competitions are announced for scientific workers, a dormitory will be built, and a sports complex. The young people are faced with the dilemma of choosing one of the nearby neighboring towns, but with an unclear professional future, or Peshtera with a promise of rapid advancement. Most make the second choice. But irrespective of that, the factory needs specialists, so does expanded production.

It is not easy to work in a biotechnologocal factory. The processes of biological synthesis demand unswerving adherence to technology. Work goes on day and night -- the fermentation process takes hundreds of hours. All raw materials, substances and fuels must arrive on time in order to ensure continuous production. It's not easy, but that's the future. And we are rapidly moving toward it.

12907
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EAST EUROPE/ELECTRICAL SYSTEMS

SYMPOSIUM HELD ON AUTOMATING POLAND'S ELECTRIC POWER SYSTEM

Warsaw ENERGETYKA in Polish No 11, Nov 85 p 454

[Article by Dr Tadeusz Kalinowski: "The Automation of Poland's Electric Power System"]

[Text] A symposium on the direction of Poland's electric power industry over the next 15 years was held in Wroclaw on 11 and 12 September. The meeting was organized by the CNPAE [Power Automation Research and Production Center] and the IASE [Power System Automation Institute]. Participating in the meeting were workers at all levels from electric power plants, electric power equipment plants, electric power districts and power distribution centers, as well as scientists from the technical schools and institutes. Directors J. Trojanowski and J. Rakowski were also present as representatives of the MGiE [Ministry of Mining and Power]. Representing the SEP [Association of Polish Electrical Engineers] were A. Lisowski, a member of the SEP Main Administration, and Z. Lubczynski, president of the SEP Wroclaw chapter. Prof J. Kozuchowski chaired the plenary session.

Fifty-seven papers were prepared for the symposium, some of which were published in ENERGETYKA, Nos 8 and 9, 1985, and the remainder in PRACE IASE, Vol 39. Four problem papers were presented at the plenary session, which described current world trends and, in conjunction with this, the concepts for expanding the automation of Poland's electric power system. At the conclusion of the plenary session, the symposium participants deliberated in two sections. Section I encompassed problems on automating the electric power system, distribution centers and networks; and Section II discussed the problem of automating electric power plants.

Many valuable proposals were evaluated during the discussions, outlining the main direction of activities over the next 15 years based on the electric power system's current needs. Among other things, it was postulated that provisioning the power distribution system with new equipment, especially computer equipment, to collect and process data and to control equipment must be accelerated. It was stated that the remote control of medium-voltage power stations should be expanded. The need to intensify research on new electric power station automation equipment (microprocessing systems, integrated control sytems) and on work designed to create an integrated microprocessor system to monitor and control power units were emphasized.

In his speech, Director J. Trojanowski stated that in view of Poland's projected power shortage priority should be given to those activities that will alleviate this shortage. Thus, to decrease power demand during the peak power period, it is necessary to influence consumers via tariff measures, along with the use of new measurement-control systems (URE, ERE) and guidance systems (CSA, the radio network). Priority should also be given to automation, which should decrease electric power plant failures while increasing electric power plant availability, and to increasing the reliability of intersystem connections.

Comparing CNPAE and IASE achievements and goals with the projected and current needs of the electric power system confirms the legitimacy of the expansion concepts regarding the automation of this system.

A commission chaired by Doc T. Halawa developed the following recommendations based on the results of the discussions.

Recommendations

1. The present status of the distribution control systems at the PDM [National Power Distribution Control Center], ODM and ZDR levels require that the building of new systems be accelerated. These projects, executed by CNPAE-IASE, should be top priority and based above all on computer types available on the socialist-country market. Additional efforts must be made to assure the availability from Polish industry of better quality computer and peripheral equipment.

2. Further, esential development of remote control systems for the transmission network and expanding the remote control of the sub-transmission network in conjunction with local control systems, and the automation of power stations require that design and construction work be accelerated and coordinated (IASE-CNPAE, EP Poznan, EP Krakow and the Institute of Power) as well as the coordination of this work with electric power service requirments. These should be top priority tasks in the projects specified by the MGiE KSE [National Power Network] automation team.

3. To integrate the operations of the distribution services at all levels concerning computations and programming, the KODA data base used by the PDM should also be used by the ODM and ZDR.

4. The direction of work assumed by CNPAE-IASE regarding nuclear power should be acknowledged as proper and justified. They concern research on control systems and technical means of automation that can now be used at the Zarnowiec nuclear power plant.

5. Because of the current and projected situation in the electric power system, work should be intensified to improve systems to automatically regulate power units. Therefore, CNPAE should develop guidelines to modernize these systems.

6. In conjunction with the development of new technological means for automation (microprocessor systems, integrated control systems and the like),

work should be intensified on implementing these new means. This work should be preceded by investigations to better identify those facilities requiring automation.

7. Work should be initiated on creating an integrated microprocessor system to monitor and control electric power units.

8. Independent of work related to the automation of large power units, further research on the development of production of equipment needed to control and regulate small hydropower plants as well as simple regulation systems are necessary. This theme should be considerd in CNPAE's work plans.

9. Of special importance is work on implementing new technical resources to assure power consumption control, as well as measuring-control systems to permit the use of new tariff solutions.

10. In designing the automation of the KSE, it is necessary to consider the need for reliable power plant and transmission network operations, especially intersystem connection, in order to create proper operating conditions for KSE operations and reliable power to customers. This will be especially important in case a power shortage occurs.

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EAST EUROPE/MICROELECTRONICS

CSSR ELECTRICAL ENGINEERING MINISTER OUTLINES GOALS

Prague TECHNICKY TYDENIK in Czech No 2, 7 Jan 86 pp 1, 7

[Article by Prof Eng Milan Kubat, DrSc, Minister of the CSSR Electrical Engineering Industry: "On the Goals of the Electrical Engineering Industry in the Eighth 5-Year Plan"]

[Text] The exhibition "Applications of Electronics and Automation '85" at the end of last year again revealed the enormous interest of the general public and professionals in the process of applying electronics in all areas of our lives. Today, a few weeks before the 17th CPCZ Congress and in the first weeks of the Eighth 5-Year Plan, we are again thinking about not only the development of electronics, but about our entire electric engineering industry.

Results of the Seventh 5-Year Plan

A few days ago we finished one of the important stages in the development of the electrical engineering industry, which was the Seventh 5-Year Plan. The characteristic feature of that stage was the intensive and systematic attention that our communist party gave to the development of electronics. The 16th CPCZ Congress gave electronics a definite priority. It established demanding goals, but also, as can now be seen, realistic ones, the fulfillment of which led to an actual direct impact of electronics on all areas of our lives. This was undoubtedly also helped by the creation of an independently managed branch of the electrical engineering industry, a new organization of its research and production base, and the development of cooperation with the electronics departments and branches of the socialist countries.

By way of illustration, we will give several examples:

At the beginning of the 5-year plan, we developed the piece rate production of the SMEP series of small computers into serial production and we developed a number of different models which made it possible to employ them in the most varied fields. Our largest producer in this field, the ZVT Banska Bystrica concern enterprise, completed the 5-year plan as early as August 1985 and exceeded even the expanded plan by more than 150 million korunas. Its production during the 5-year plan amounts to 1,160 minicomputers and 5,500 microcomputers, which is 1,480 more than the plan called for.

--To acquire a wide circle of technicians for utilizing microprocessors in machinery, equipment, and technologies, at the time of preparations for the 16th CPCZ Congress we took on an obligation to supply 200 educational suitcase microcomputers for professional training. We met this obligation, but it took only a short time before these suitcase-types were rapidly made obsolete when production was begun on the improved personal computers PMD 85 and IQ 151, the SMEP series personal computers, and the SAPI 1 small industrial computers. Our department was joined in this effort by production teams, higher schools, and the associated production of some JZDs [unified agricultural cooperatives]. The Central Committee of the SSM [Union of Socialist Youth] acted with great initiative and, in addition to the Center for Youth, Science, and Technology equipped with personal computers, it progressively opened up more than 100 centers where these computers took firm root and around which we today find tens of thousands of young people pursuing a hobby of electronics and computer technology. And the previously useful suitcase microcomputers which had served their purpose are now a thing of the past.

--We introduced serial production of modern color television recievers and color picture tubes and began to expand the models available.

--At the beginning of the 5-year plan, we had an adequate supply, and for a while even a surplus of electric components. Repeated reductions in their wholesale prices gave the designers in other branches new courage and increased rate in the utilization of electronics in machinery and equipment in a number of production and non-production organizations now is already showing up in a noticeable shortage of components, even despite the fact that production of, for example, modern integrated circuits, has increased 3.5 times and the production of the component base has more than doubled in the Seventh 5-Year Plan.

It would be possible to give other examples, but we will get back to this in talking about the goals of the Eighth 5-Year Plan. Achieving a higher rate of development of production in electronics right from the start of the 5-year plan made it possible for the department to meet the goals established by the plan already, to increase production to 148 to 150 percent, which is the upper limit of the directives of the 16th CPCZ Congress.

Allies of Electronics in Our Economy

However, meeting the production goals in our department is only one of the conditions for application of electronics in the development of the national economy. We are therefore very pleased that today we have a number of powerful allies in our efforts to develop application of electronics to the national economy, whose numbers are constantly growing in all the production branches, as well as in non-production fields. Electronics is rapidly having an impact on our lives, and not only on the basis of management from the top, but what is even more valuable also on the basis of the creative initiative of research workers, design offices, technologists, and production organizers. For example, an overview of the creative activities of the youth in the Zenit movement, as well as the exhibition "Applications of Electronics and Automation" or the okres and plant exhibits of electronics are proof of this. Also an unusual amount of information, compared with the past, about creative applications of

electronics is carried by our mass means of communications, especially television and radio. All this testifies to the fact that the process of applying electronics has begun to take place intensively throughout our society and year by year is growing in its intensity and quality.

Qualitatively new approaches in this process are particularly important both in the individual branches and in entire fields, as well as in territorial agencies such as, for example, in the Gottwaldov okres. Electronics has also taken firm root in our educational system, in the extracurricular education of our young people, and in the activities of youth social organizations, the ROH [Revolutionary Trade Unions Movement], and Svazarm [Union for Cooperation with the Army]. A systematic approach is being taken to the application of electronics in agricultural plants and cooperations and in medical and cultural facilities. For hundreds of thousands of our citizens, electronics is becoming an inseparable part of making use of their free time.

The process of electronics applications, which is supposed to be further intensively developed on the basis of state target programs A 07 and A 08 (Long-range Overall Program for Application of Electronics to the National Economy), again offers us proof of the fact that our socialist society is capable of mobilizing new forces and that it is capable of absorbing this new technology. An important push in that direction is also being given by the initiative of the Prague communists in developing a commitment in honor of the 17th CPCZ Congress which is leading to enlightened approaches to the technical and economic development of our industry, is leading to a systematic effort, and is giving practical suggestions as to how to proceed further in the creative and work collectives. This effort, which we call the Prague initiative, is finding more and more response in other krajes and okreses of the republic and in individual enterprises and plants. The development of electronics is an important part of this initiative.

The Decisive Goals of the Eighth 5-Year Plan

How the material goals which we are taking on in the Eighth 5-Year Plan are different can be clearly shown by several examples: In comparison with the Seventh 5-Year Plan, in the current Eighth 5-Year Plan there will be many important innovations in the components base. In the production of integrated circuits, silicon discs 4 and 5 inches in diameter will be used in place of the discs 3 inches in diameter, which will make it possible in production to up to triple the number of chips made from one silicon disc.

In contrast to the LSI technology with structures of 4mm density, we are mastering VLSI technology with 1.5 to 2 mm density. There will be production of 16-bit microprocessors, DRAM memory with a capacity of more than 100 kilobits, and special order integrated circuits for, for example, auto electronics, telecommunications, and medical and consumer equipment.

An entirely new technology to be introduced in the Eighth 5-Year Plan will be the surface mounting of components on an area connector with no openings. As opposed to the usual assembly, this will save up to two-thirds of the disc space needed. But this requires an entirely new generation of components,

especially their casings. Significant progress will also be made in preparing materials for the production of microwave transistors and integrated circuits were we plan on wider applications of gallium arsenide.

Higher order innovations in the components base also include new types of innovative final products. In capital investments in electronics, there will be a further modernization of television and radio broadcast transmitters, characterized by operation without service personnel and automation of the accompanying measuring equipment. To support satellite transmissions, preparations are being made for the production of a professional receiver station of the second class at the end of the Eighth 5-Year Plan. Innovations in telecommunications equipment are characterized by the continuing transition from conventional electromechanical centrals with a relatively low utilization of electronics to fully electronic (fourth generation) central exchanges. In addition to the branch centrals which received electronics applications in the current 5-year plan, there will be electronics installed in small, middle-sized, and large centrals for our communications and for export to the USSR.

These changes require a retooling of our telecommunications enterprises to the new technology utilizing up to four-level area connections with a gradual transition to surface mounting and to being equipped with special types of testers and simulators for testing the entire equipment.

In this 5-year plan, we put emphasis on consumer electronics mainly on the development and production of sound recording and reproduction equipment and the development of production of color television receivers with in-line picture tubes. In the Eighth 5-Year Plan, in addition to modernization of existing equipment characterized by improved convenience, digital operation, a higher level of design and several special services such as stereo sound and the reception of supplementary information on color television receivers, the main attention is directed at the development of production of audio-visual equipment. This mainly concerns video tape recorders and digital CD phonographs.

Similarly, efforts at innovation are oriented in the same direction in the fields of high-voltage electrical engineering and medical, measuring, and laboratory equipment.

Extensive innovations also require a retooling of the technological base of the departments that will make an important contribution, as well as an increase in the capacity for its own production of single-purpose technological equipment. We expect that expenditures for technology will contribute to a significant increase in the productivity of labor, which by 1995 is supposed to nearly triple in comparison with the Seventh 5-Year Plan.

The Development of Electronics in the World and Our Situation

Our philosophy of innovations in the production programs and our developmental strategy are based on very specific goals in the development of the individual fields, groups of products, and decisive representatives of production. We are very carefully keeping an eye on what directions and what growth rates

electrical engineering and electronics are taking in the world. We know the technical and economic parameters of the products of the leading manufacturers. We are making it a goal in the first phase in some fields to acquire the results of world progress rapidly by means of licensing, cooperative ventures, and the purchase of samples and in some areas at least to catch up with the rate of technical and economic development of world electronics and by this route to reduce the lag behind the most advanced countries as well. We are aware this is a most expensive goal and we are aware that the lag will not be reduced much even if we accelerate out progress in production, development, and procedures because electronics has made such an exceptionally rapid leap forward in the past few years. In the years 1980 to 1984 in the 11 most advanced countries, the production of electronics increased by an annual average of more than 16 percent. Even the most optimistic predictions for development were exceeded. (These reckoned on a growth rate of around 12 to 14 percent.)

We were not ready for such growth rates in the past and in particular we lacked modern technology and also some crucial materials. Despite this fact, in the Seventh 5-Year Plan the department grew by an annual actual growth rate of 8.5 percent (more rapidly in electronics). For the period of the Eighth 5-Year Plan we have set higher goals for ourselves which have no parallel in Czechoslovak industry. We wrote into the plan for the Eighth 5-Year Plan the goal of increasing the production of the overall electrical engineering industry in the years 1986 to 1990 by almost 65 percent, which is an annual average of 10.5 percent, but as far as electronics are concerned we plan on an average annual growth rate of over 12 percent, with 17 percent for the components base, and even 28 percent for microelectronics. This is a great deal, but the current boom in electronics applications shows that society will gradually demand even more of us.

At the same time, we do not hide the fact that we have bottlenecks in the speed and quality of developing technology, in technical and material support, in the effectiveness of technical development, and elsewhere. But we consider the decisive fact to be that these questions are coming under public control and that the interests of society in this field are becoming more and more demanding. We consider as extraordinarily important the fact that solution of the problem of application of electronics and the development of our industry are being given special attention not only by the CPCZ Central Committee, but by the entire organizational structure of the party and our entire public.

Conclusion

On the occasion of the end of the Seventh and the beginning of the Eighth 5-Year Plans, we have often run into the question of whether we succeeded by 1985 in accomplishing everything that we took on in 1980. In order to answer that question, we have to give some figures.

According to the law on the Seventh 5-Year Plan, the growth in production by the electrical engineering industry by 1985 was supposed to reach 40.2 percent. At the time that the law was published, that is, in 1981, it appeared that this was too much and doubts existed as to whether that output would be used, whether

it could be sold. (Indeed, the growth rate of the other industries was only 20 to 25 percent during the 5-year plan.) Today we know that during the Seventh 5-Year Plan we achieved a growth rate of 50 percent, not 40 percent, and that is in fact too little.

The reason is a simple one; applications of electronics is speeding up and demand exceeds the actual production capabilities. We are in an analogous situation in the Eighth 5-Year Plan where we are planning on an increase in production of about 65 percent. And again we are encountering doubts as to whether such a rapid rate of growth is necessary. And again, in signing the contracts in 1986, we found that the level of need has again moved up and that these needs again exceed not only the estimates, but also the production capacity.

Our industry could produce more, and not much would have to be done to accomplish this, just get rid of some bottlenecks especially in the field of hard currency exchange for technology and new materials and in some cases in the field of ensuring the delivery of materials from Czechoslovak industry. We are striving to take care of these problems.

Another question which complicates our planning for production is that of unexpressed needs for electrical engineering output among our customers. Sometimes these are excessively large demands which are then not covered by the financial capabilities (medical, educational, etc.). In other cases, it is lack of clarity as to the requirements for various inventory, untrained designers etc. As late as the spring of 1985, the engineering industry was requiring less electronics for the Eighth 5-Year Plan that was the fact in the Seventh 5-Year Plan. Today there is a growth of 40 to 50 percent and there is a shortage of not less than 6 billion korunas of products (control systems and high-voltage equipment).

There is a similar situation from the standpoint of technical development. Much has been accomplished, for example, in the quality, reliability, etc., but we are not satisfied with the overall level of innovative activity and we say quite openly that we would like to be further along. There continues to be problems with foreign exchange and materials, as well as inertia in management and inflexibility in production and marketing. We are carrying out a persistent struggle for innovation, particularly by means of material and moral incentives.

It is understandable that in the case where the process of research--production --utilization works relatively well this process has a certain law of regularity to it. If we come out with a new product, as a rule it is not possible to make this product available to every user from the first day that it hits the market. In other countries, this problem is resolved by sharp differences in the pricing policy. This method is not commonly used here, so that demand can temporarily exceed supply by a great deal. We are not helped much in this matter by the domestic market, whose estimates of consumer interest often have too broad a range.

In the past few years we have decided to participate to a greater extent in trade fairs, exhibitions, festivals, and other occasions where our products can be displayed. We attempt to include in these exhibitions those products which have already begun to be produced in limited amounts or which will be put into production no later than the following year. In some cases there has been criticism of our actions in that the products exhibited are not on the market. On the other hand, this pressure can also have positive and constructive consequences and force our manufacturers to come up with innovations more rapidly, to institute more flexible production, and in particular to react more sensitively to the demands of the market and to search out the customers' interests. It is helpful for the enterprise to see that this pressure is not being created just by the managers of the department, but is also a matter of the objective needs of our entire society.

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EAST EUROPE/SCIENTIFIC AND INDUSTRIAL POLICY

SCIENTIFIC-TECHNICAL COOPERATION AMONG CEMA MEMBERS

Sofia OTECHESTVEN FRONT in Bulgarian 10 Feb 86 p 7

[Article by Marin K'osev: "Robot RB-251 Goes Into Production -- Cooperation In the Most Promising Spheres of Scientific and Technical Progress. Moscow. A special report for the journal OTECHESTVEN FRONT]

[Text]-- Adoption of the complex program for scientific and technical progress of the member countries of CEMA upto the year 2000 marks a qualitatively new phase of fraternal cooperation, the rapid and strict fulfilment of which is an important economic, political, state and party task, a principal direction in the activity of the Council for Economic Mutual Assistance -- so spoke Vyacheslav Sichov, Secretary of CEMA, at a meeting with representatives of the mass media.

The member countries of CEMA are working in an organized and beneficial manner toward gradually putting the program into action. In the past two weeks alone, 5 meetings of the plenipotentiaries of the countries have been held in the Secretariat of the organization on the five principal directions of cooperation. For every one of the 93 major problems included in the program, they have specified not only the leading organizations and coordinators of the work, and the companies responsible for execution, but also personnel, governmental, departmental and scientific leaders. Intense preparations are being made and, during the first half of the year, we expect that 67 new agreements will be signed and 84 existing agreements renewed, regulating the forms, methods and responsibility of the participants in this multilateral, mutually advantageous cooperation.

The countries of the community face enormous tasks. Their joint solution demands a consolidated effort and broad use of the wealth of experience that has already been accumulated. Of significance in this respect is the excellent organization of cooperation in the sphere of atomic machine building and robot technology.

Today, specialization and cooperation in the production and reciprocal supply of atomic installations are based on the multilateral agreement of 1979. Specialized production of over 140 types of the most modern equipment for atomic power stations and power units of 440 to 1000 megawattsis planned.

Approximately 50 companies and associations from eight countries are engaged in the solution of this very important problem. The results are excellent.

In keeping with the agreement, Bulgaria, for example, is producing transport and technological equipment, devices for biological defense, special pumps and accessories. Hungary is providing its partners with special maintenance machines and some types of electrotechnical articles. The German Democratic Republic is ensuring transport and technological equipment, special accessories and cranes. Poland is offering heat-exchange equipment, control system appliances for radiation safety and internal reactor control. Romania is represented with cranes for turbine rooms, large circulation pumps, gauges and transformers for high-voltage appliances. Czechoslovakia is producing a significant part of the technological equipment, including reactor installations. She is mastering the equipment for atomic power plants of a new generation of 1000 megawatt reactors. The USSR is ensuring practically all the equipment for atomic power plants.

Experience in developing and organizing specialized and cooperative production of industrial robots is also edifying. As a result of the joint efforts of Bulgarian and Soviet specialists a prototype of robot RB-251 has been produced which is intended for welding. Specialists from the USSR and ChSSR have organized the production of a robot for metalcutting machines and pressing equipment. Recently, the international scientific industrial association "Interrobot" was founded on a multilateral basis to plan work according to an international division of labor. For example, Bulgaria specializes in the creation and production of robots for carrying protective covers, and for assembling articles in machine-building and electronics.

In the modern phase of multilateral cooperation between the fraternal countries, the gradual, accelerated fulfilment of the complex program for scientific and technical progress is of major importance. This is the heart, the principal direction of the activity of CEMA.

12907
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EAST EUROPE/SCIENTIFIC AND INDUSTRIAL POLICY

CHANGES IN POLAND'S MANAGEMENT OF SCIENTIFIC-TECHNICAL DEVELOPMENT

Gdansk BUDOWNICTWO OKRETOWE in Polish No 11, Nov 85 pp 445-446

[Article by Mgr Eng Wieslaw Niesluchowski: "Changes in Directions in Managing the Development of Science and Technology"]

[Text] Two levels of managing the development of science and technology exist in Poland: the central level and local-plant level.

The central level encompasses the development of science and technology in its broad aspects, where, as a rule, task executors are PAN [Polish Academy of Sciences] institutes, academic and industrial institutes, research and development centers, design bureaus and other leading centers concerned with the development of technology. The realized tasks can be characterized as basic or applied research, and application work.

The local-plant level encompasses work directed mainly toward the immediate needs of the given enterprise. This work is done by the enterprise's technical services and possibly by design bureaus, research and development centers and academic and industrial institutes.

Beginning at the end of the 1960s, and in practice at the beginning of the 1970s, central management of developing technology was in the form of government programs, and basic, interministerial and ministerial problems. This activity was coordinated on a national scale by the MNSzWiT [Ministry of Science, Higher Education and Technology], which concluded multiyear agreements with ministries responsible for realizing specific programs and resolving specific problems. The responsible ministry designated primary coordinators that developed multiyear and annual plans coordinating the development of a given branch or industry. The annual segments of such a plan, assessed by a specially constituted coordinating group, formed the basis for concluding a general agreement between the responsible ministry and the primary coordinator. Such an agreement provided the foundation for concluding agreements with executors of specific theme tasks.

The Council of Ministers Resolution No 180 concerning government orders to realize vital tasks in the area of developing science and technology was passed in December 1983. This resolution instituted a new form for centrally managing such tasks. A government order is based on consignment of tasks to an organizational unit, called the general executor, by a proper top state administration organ that is based on a concluded agreement. State or mixed enterprises or cooperative units can be general executors. An appropriate research unit or higher school can also be a general executor if it is very involved in scientific research to resolve some problems.

The object of a government order should be the scientific-technical resolution of a specific task, bearing the trait of progress, representing explicit results of research work that is defined accurately via appropriate technical and economic parameters, together with their implementation into economic practice, mastery of production and achievement of production capability, making it possible to achieve desired material and economic results. The object of a government order can also be the implentation or appropraite propagation in production of solutions resulting from research work, an important Polish discovery or a purchased license. In specific cases justified by the nature of the task, the object of a government order can be merely research work as understood in the regulations concerning the rules for financing research work.

In the general agreement for executing a government order, performance, priviliges and preferences in the realm of obtaining bank credits, income tax rebates and allowances for the State Fund for Professional Activization are defined precisely.

The above described sturucture for centrally managing the development of science and technology is currently in the process of change. At the end of 1985, the exisitng form for central research and development programs will be abandoned, and the division into government programs, and basic, interministerial and ministerial problems will be cancelled. Beginning in 1986, two main forms for centrally managing science and technology (with the local level remaining unchanged) will be obligatory, that is:

--central research and development programs;
--government orders.

The above procedure for government orders will not change formally during the next operating period. But the central program will change primarily in the realm of its substantive content. The usefulness of proposed work and its effectiveness are emphasized. The general rules for selecting themes (goals) for central research and development programs are presented below.

The main criterion for selecting goals for central research and development programs is the effect of achieving a given goal on the country's socioeconomic development, the development of science and technology, and its effect on the widely understood effectiveness of management. In selecting goals that are economically beneficial, the following must be considered:

--the compatibility of a goal with the direction priorities of Poland's economic development;
--the effect of a given goal on achieving increased labor productivity, expanded export, including the export of scientific and technical ideas, rationalizing imports, and savings in the consumption of materials, raw materials, fuel and energy;
--comparison of the assumed technological level with the most advanced technological achievements in the world;
--linking the goals with the directions of specialization in Polish science, technology and Poland's economy;
--evaluating the extent to which existing research results can be used to realize the goal;
--taking into consideration environmental and work safety problems;
--linking the possibility of achieving a goal with investment plans;
--linking the realization of a goal with programs for scientific and technological cooperation with foreign countries;
--evaluating projected outlays for research, development and implementation (B+R+W) and the economic effectiveness of realizing the goal.

In designating cognitive goals, attention must be paid to:

--the reality of achieving the goal as scheduled (possibility of realization);
--the effect of achieving the goal on desired changes in science and the structure of production.

The manager of activity in the realm of developing science and technology is also changing.

Based on Resolution No 280 of 3 December 1984, which was published in DZIENNIK USTAW, No 55, 11 December 1984, the Committee on Scientific Affairs, Scientific and Technological Progess and Applications was formed. Based on a Council of Ministers decree, the newly created state administration organs took over the managemnt of the development of science, scientific and technological progress and applications from the then existing Ministry of Science and Higher Education.

In accordance with the Council of Ministers decree of 25 March 1985, the Committee is specifically charged with:

--preparing, in collaboration with appropriate organs and organizations, the basic assumptions for scientific and technological policy and presenting them to the Council of Ministers;
--establishing the primary directions and scope of scientific research directly serving the national economy and scientific-technological progress associated with Poland's socioeconomic development that are designated in future plans, in the national socioeconomic plan and in the central annual plans;
--initiating and assessing the directions and scope of basic research that is vital for scientific and technological progress;
--designating the principles for creating and cancelling central research and development programs that are essential for Poland's socioeconomic

development, and to assess candidates for leading coordinators to realize these programs;
--evaluating drafts of the most vital tasks in the realm of development science and technology that were detailed in the national socioeconomic plan and central annual plans, especially:
a) research and development programs that are vital to Poland's socioeconomic development;
b) government orders to realize vital tasks in the realm of developing science and technology.
--initiating and assessing the principles for financing the development of science, and scientific and technological progress, especially research and development work and its applications;
--initiating the development and assessing the use of systemic instruments, especially financial-economic, planning and organizational instruments, to optimize the selection and to improve the effectiveness of research and development work and to facilitate the implementation and application of research results into socioeconomic practice;
--promoting, coordinating and evaluating scientific and technological cooperation with foreign countries, including licensing and post-licensing policy, and exporting scientific and technological achievements.

According to the Council of Ministers decree of 25 March 1985, the tasks of the Office for Scientific and technological Progress and Applications include:

--preparing proposals for drafts of future plans, national socioeconomic plans and central annual plans vis-a-vis scientific and technological progress and applications;
--initiating and concluding agreements concerning scientific and technological progress and applications among main and central state administration organs as well as other state organizational units;
--coordinating the preparation of drafts of central research and development programs that are vital to Poland's socioeconomic development;
--coordinating and monitoring the realization of government orders concerning tasks in the realm of scientific and technological progress;
--initiating cooperation with foreign countries in the realm of scientific and technological progress and applications;
--making recommendations concerning awards for special achievements in the field of science and scientific and technological progress;
--collaborating in establishing the principles for organizing and conducting professional specialization for the engineering and technician cadres;
--performing the executive apparatus function for the Council of Ministers Committee on Scientific Affairs and Technological Progress.

Work has been proceeding since the fourth quarter 1984 on preparing research and development programs projected for realization during the 1986-1990 period and beyond. Such work is also being done in the shipbuilding and repair industries. The assumptions of the central research and development program entitled "Maritime Floating Objects and Manufacturing Technology in the Shipbuilding and Repair Industries" has been developed already. As indicated by the title, these assumptions encompass in a single program the problem of technology in the shipbuilding and repair industries. It is recognized that joint programming of research and development work for both industries

provides many benefits, eliminating many weaknesses in practice. The benefits include:

--the possibility of using achieved work results in both industries;
--eliminating duplication of work on problems common to both industries;
--the possibility of standardizing identical or similar manufacturing techniques and selecting the best one from among them;
--the possibility and advisability of taking into account the repair problem during the design phase of floating objects and their equipment.

The program of research and development work included in the assumptions are based on the programs to develop the shipbuilding and repair industries; on the documents programming bilateral and multilateral scientific, technological and economic cooperation with CEMA-member countries; and on evaluations of the status of Poland's shipbuilding industry vis-a-vis the achievements and development trends of the world ship construction industry.

The assumptions assumed by the Marine Engineering Center, as projected by the primary coordinator (in the name of the shipbuilding and repair industries), were analyzed by the Summary Team formed by the Ministry of Metallurgy and the Machine Building Industry as the responsible ministry. These assumptions were evaluated positively by the Team and sent to the Office for Scientific and technological Progress and Applications. Guided by these new criteria, the Office organized another meeting of the Summary team (new membership) to evaluate the possibility of fulfilling the required conditions of the assumptions. The assumptions of the central ship industry research and development program were also evaluated positively. Now we are waiting for the final decision of the Council of Ministers Committee on Scientific Affairs and Technological Progress. After this decision is made, the coordination plan for the 1986-1990 period and the 1986 segment will be developed.

The proposals on research and development work themes presented in the assumptions were formulated in a general way. The next step in developing the program, that is, the coordination plan for the 1986-1990 period and beyond, must be formulated with far greater accuracy. The tasks, the executors of these tasks, the schedule for completing the research and development work, the institutions implementing the results of this work and the schedule of implementations, the outlays and projected technological and economic results must be established accurately. To be equal to these requirements, close cooperation with representatives of the shipyards and enterprises manufacturing ship equipment is assumed. The ship industry research and development work program must also be closely coordinated with the programs of the schools, the PAN, industrial institutes and other centers cooperating with the ship industry. The development of such a program is not an easy task and will be possible to execute only with the full involvement of interested institutions and individuals.

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